Chemical Age

ANNUAL REVIEW AND 1959 PREVIEW
(page 73)

VOL. 81 No. 2061

10 January 1959

It's

"Metal Containers" Age

METAL CONTAINERS LTD., 17 WATERLOO PLACE, PALL MALL, LONDON

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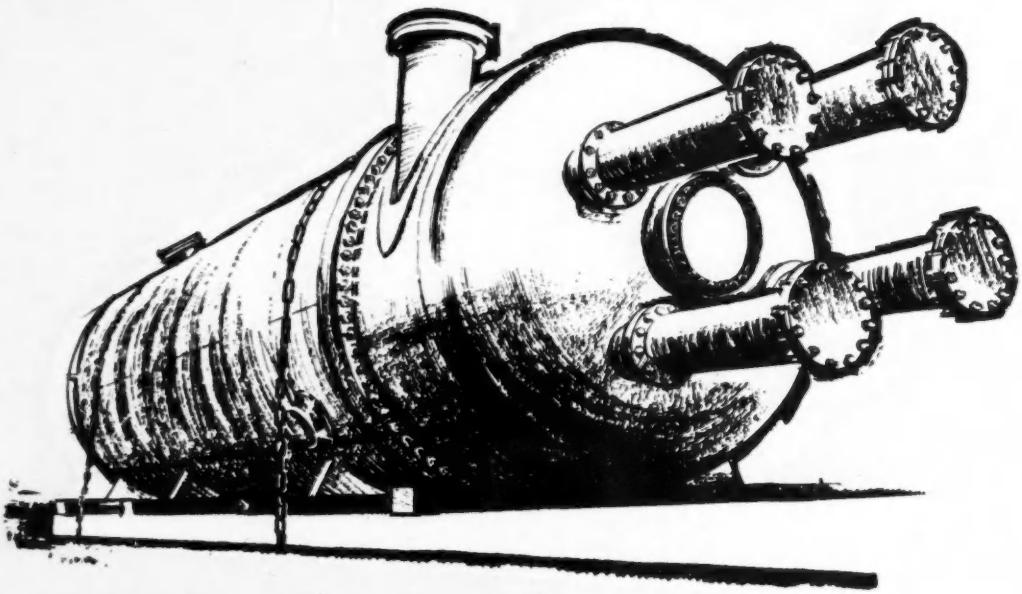

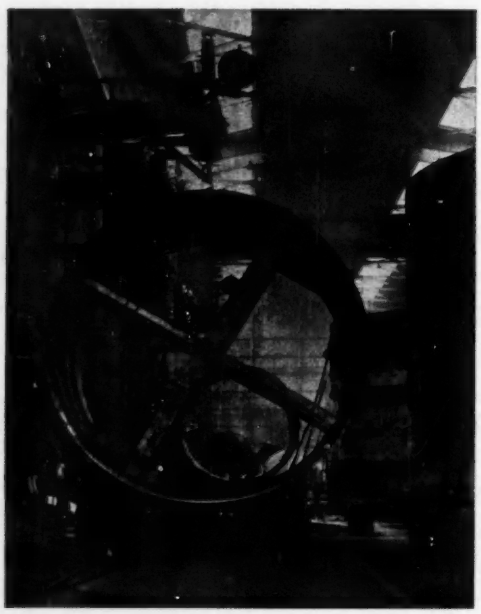

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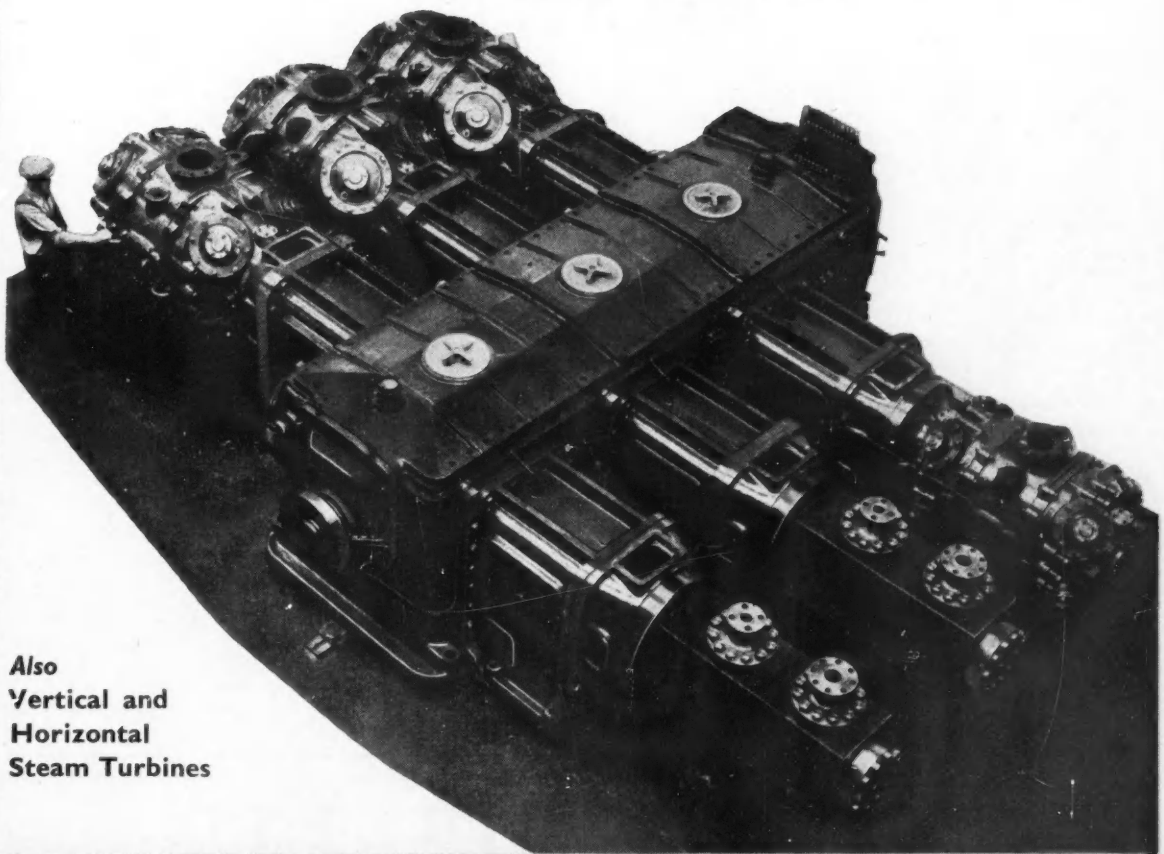

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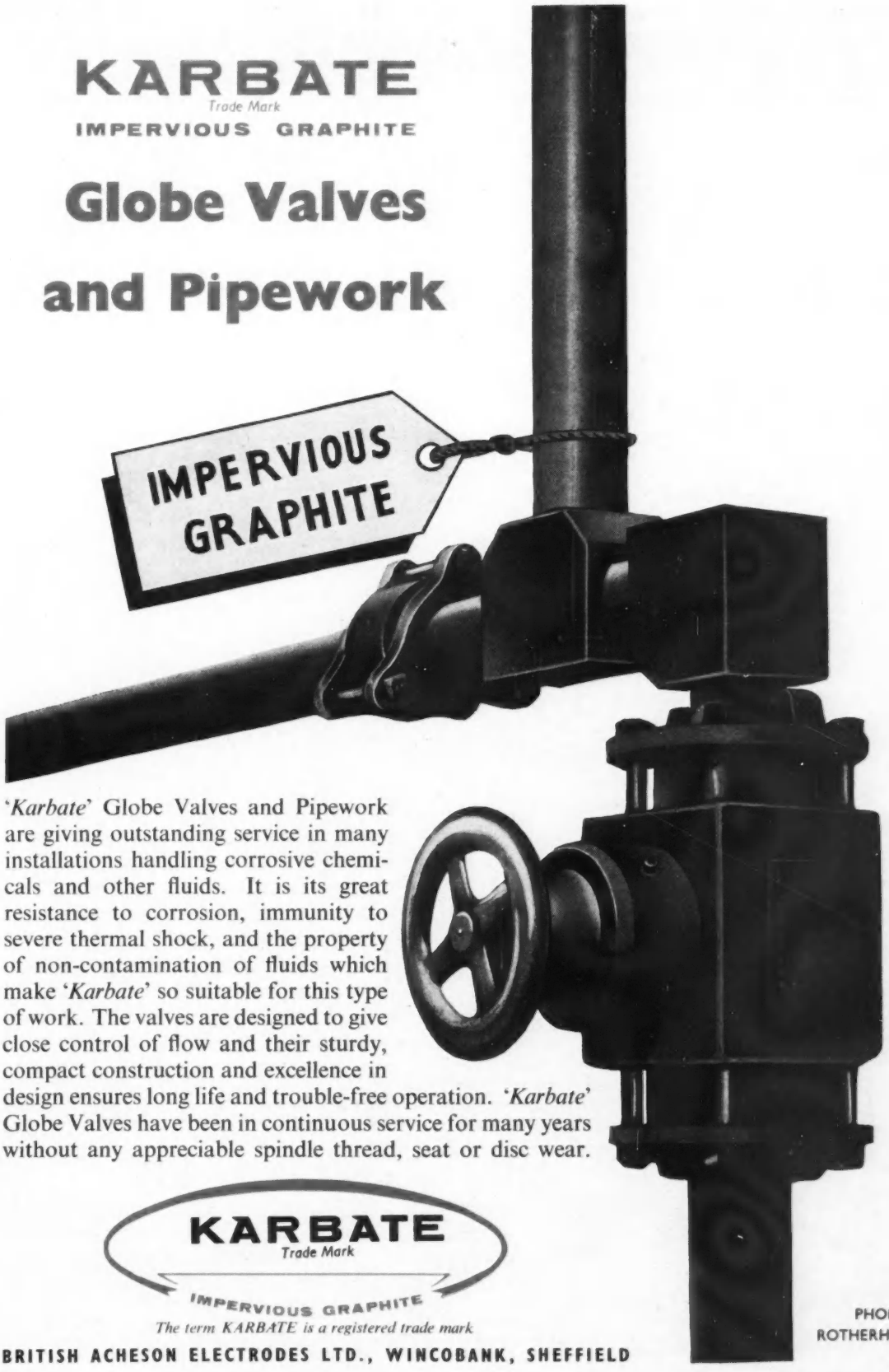

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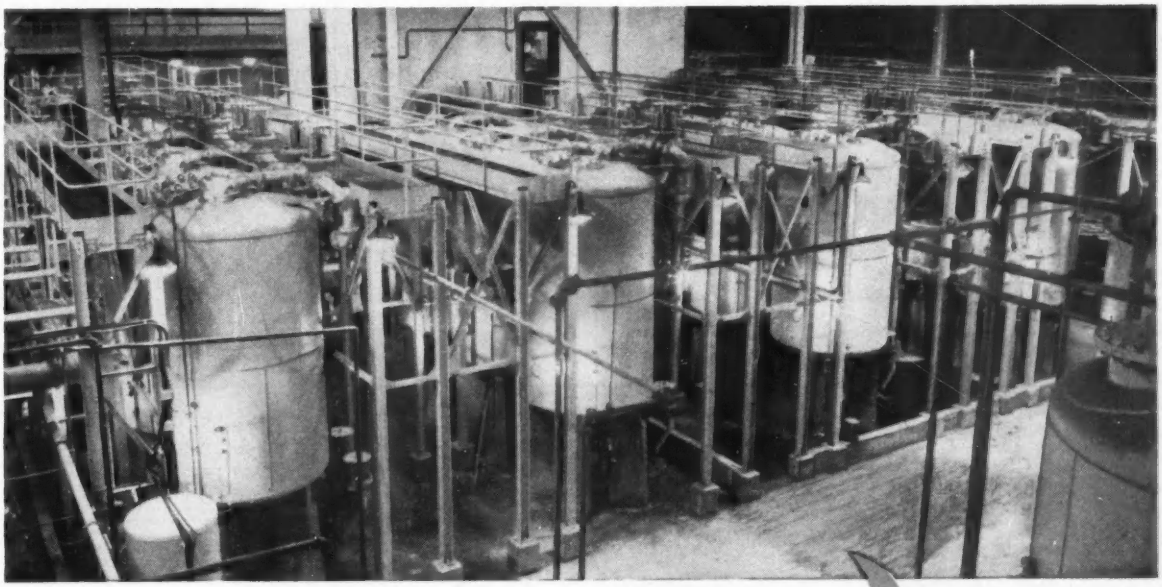

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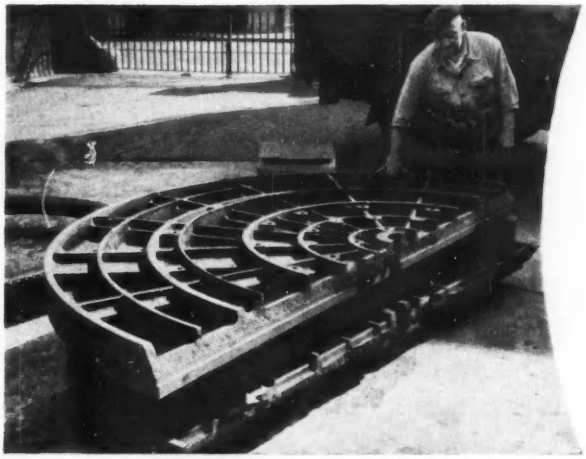

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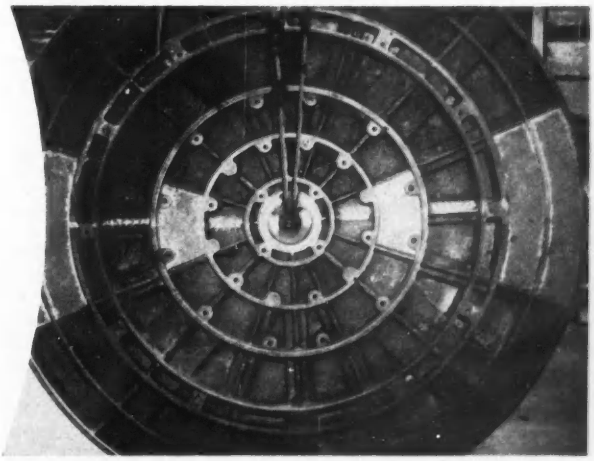

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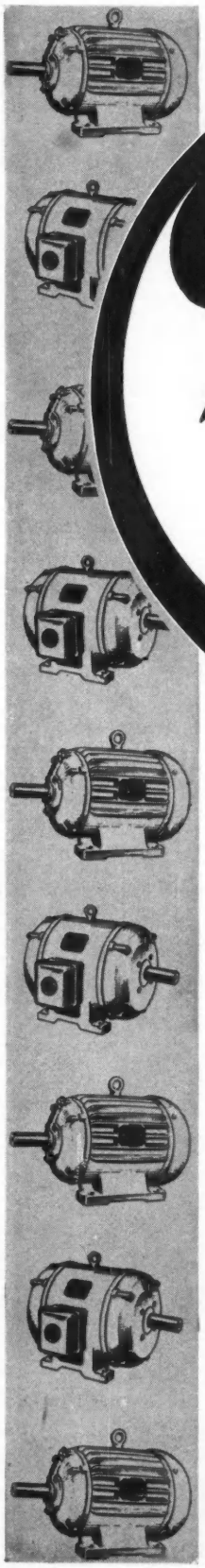

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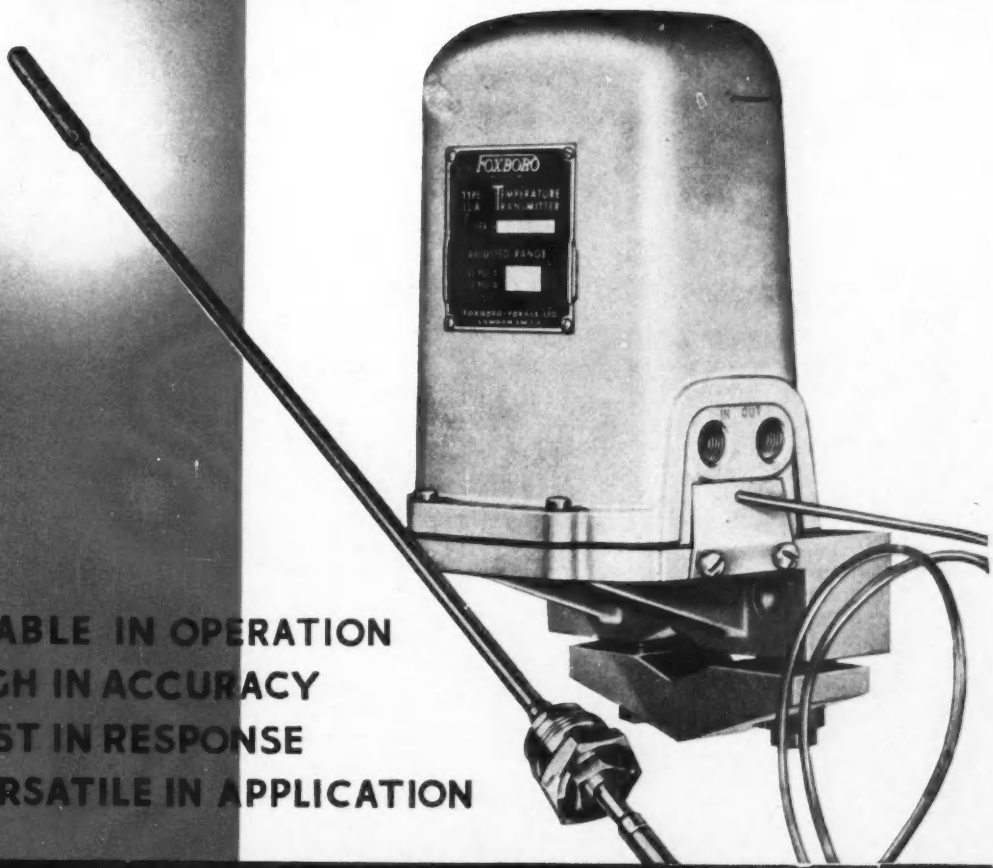

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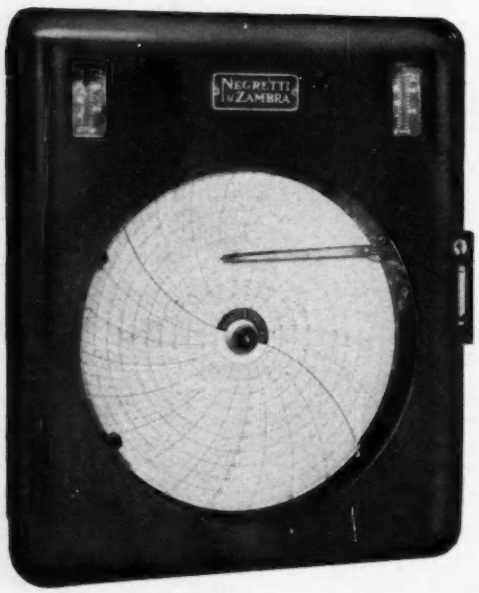

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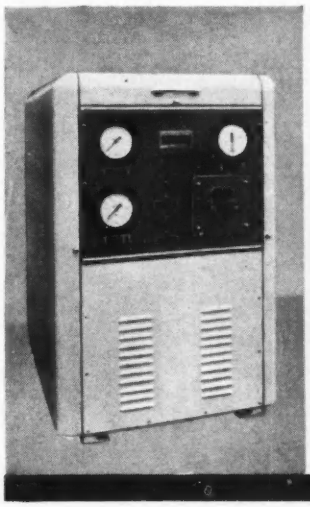

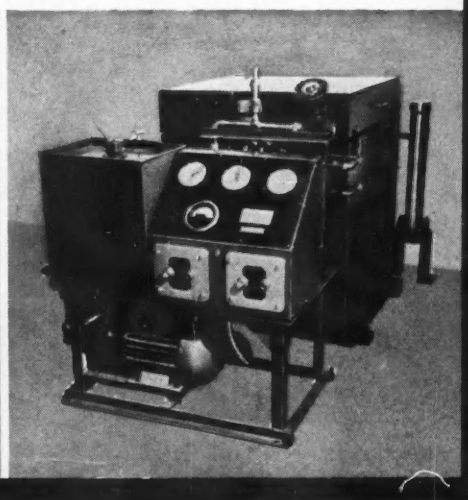

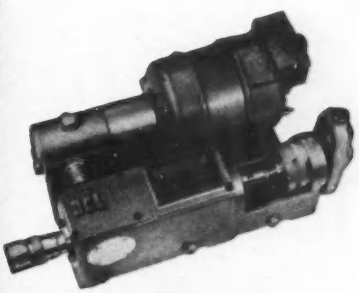

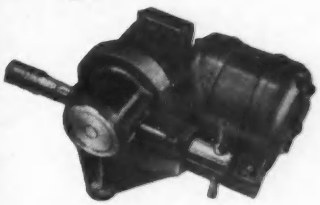

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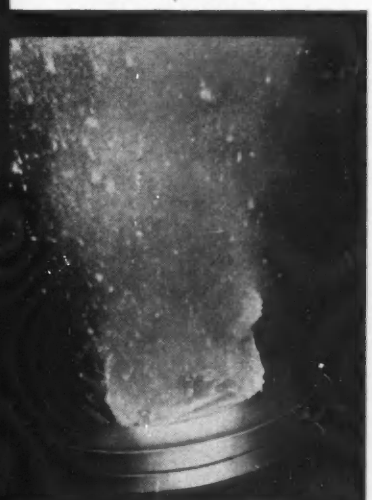

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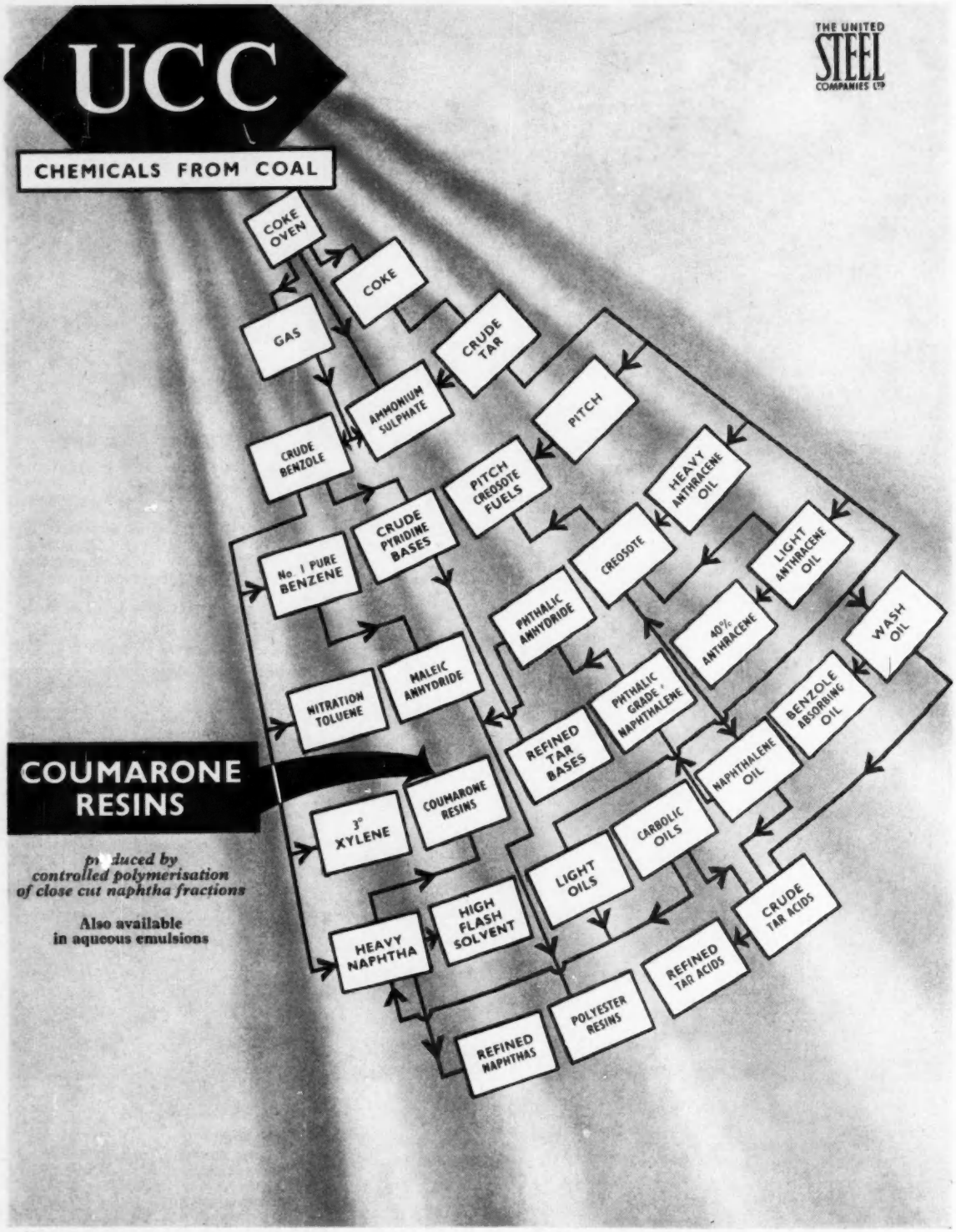

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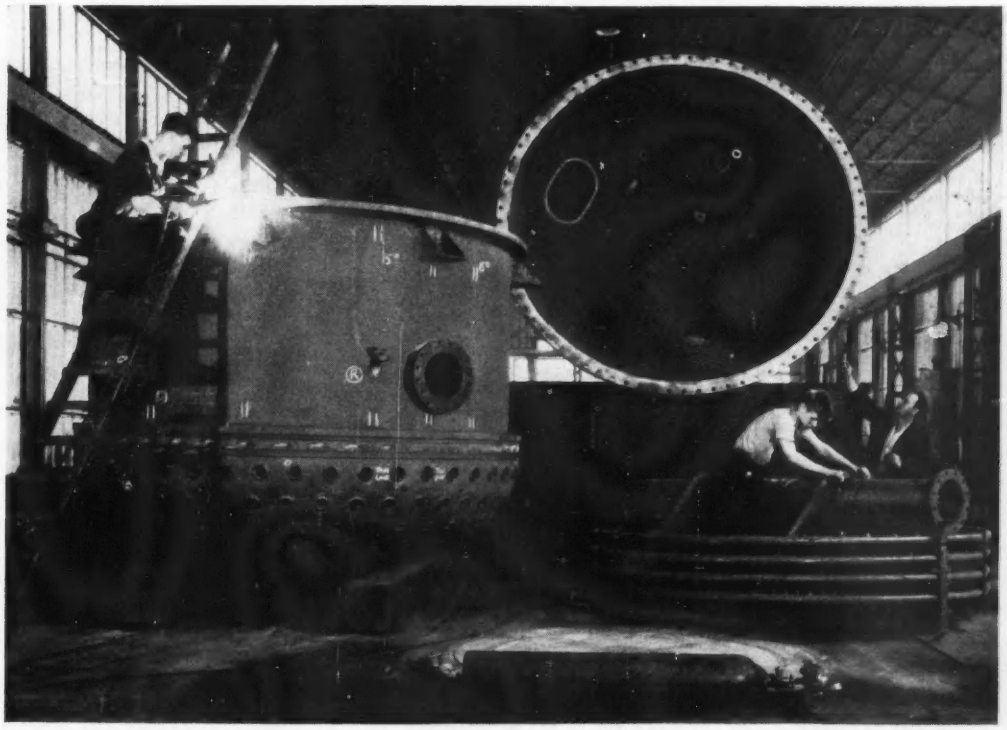

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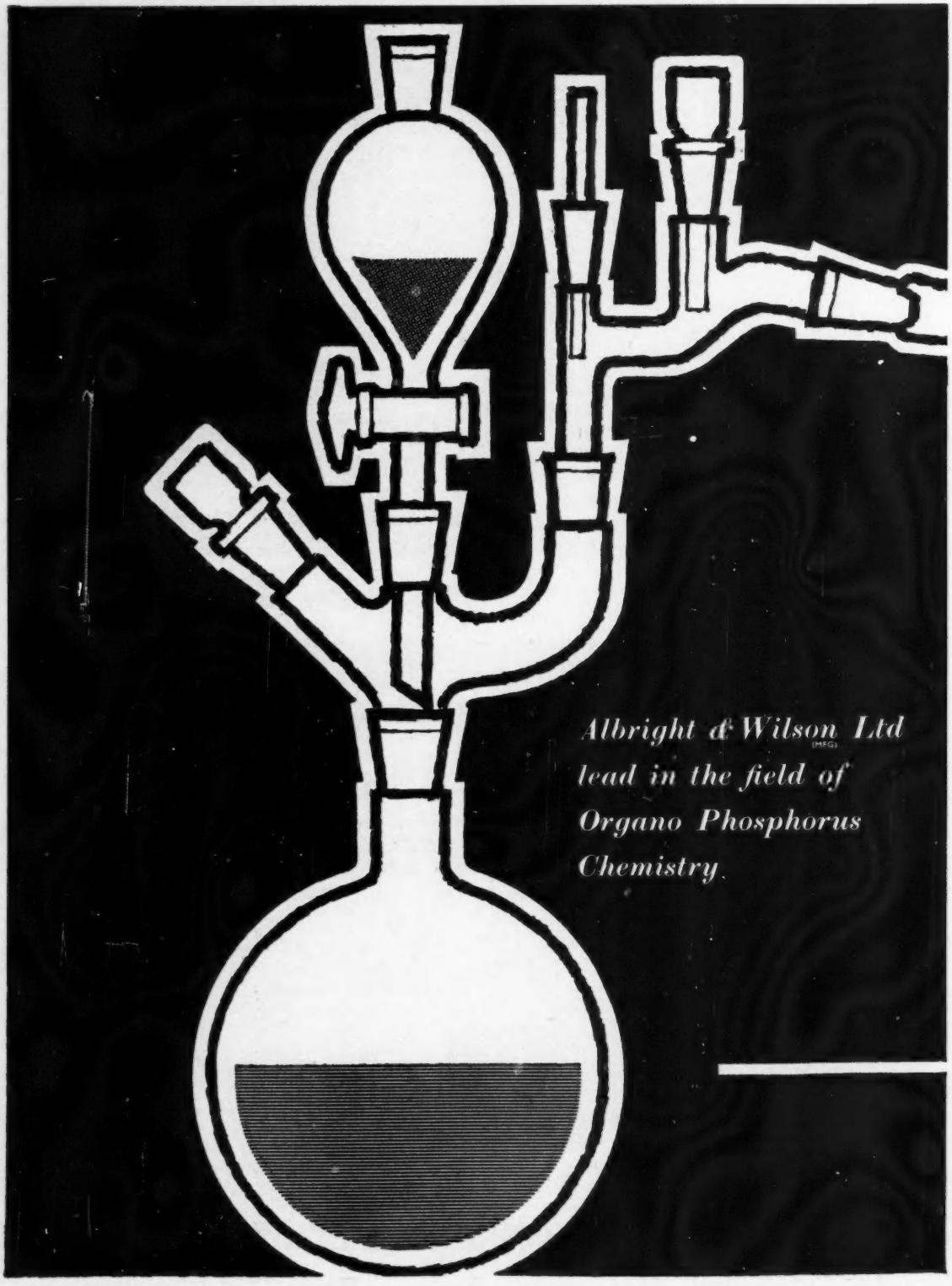
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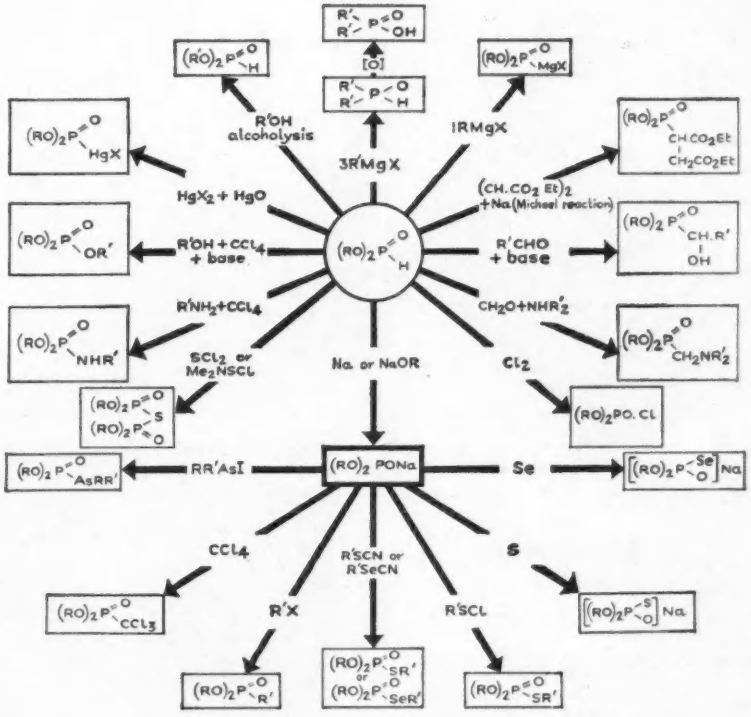

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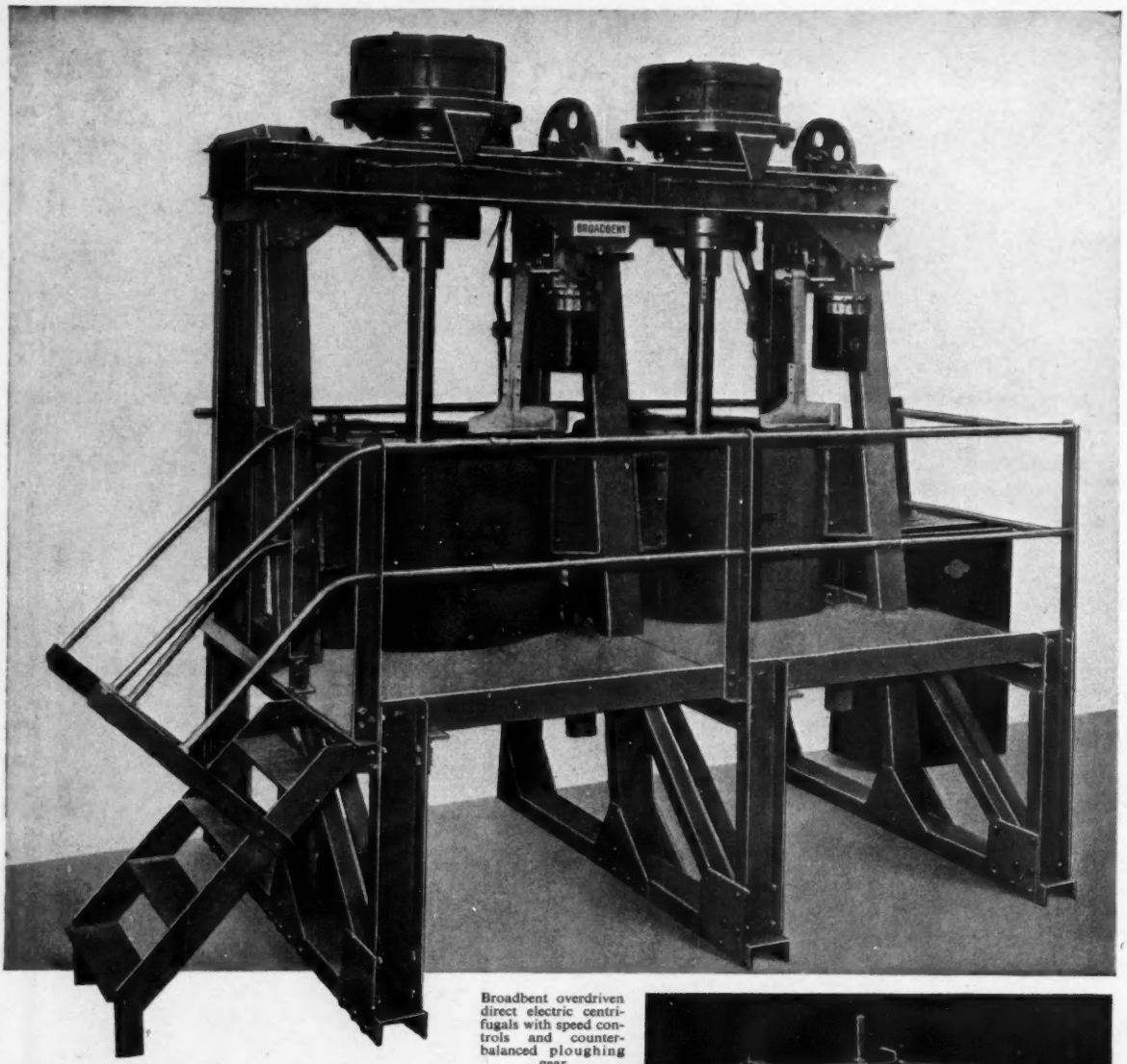

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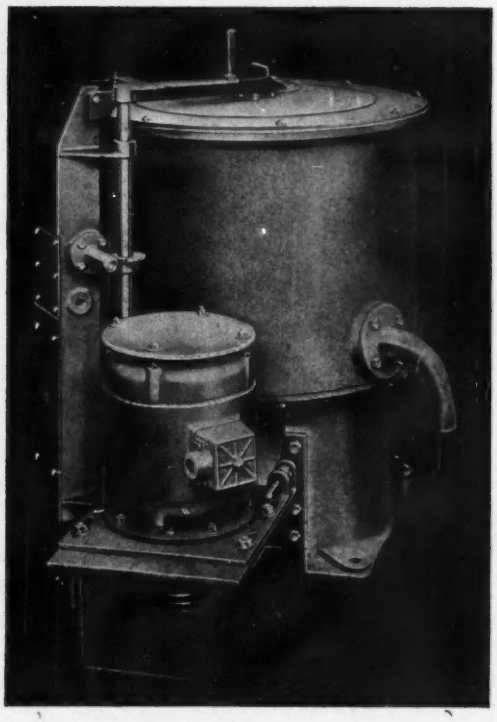

Broadbent 21" type 86 centrifugal with an interchangeable basket and outercasing

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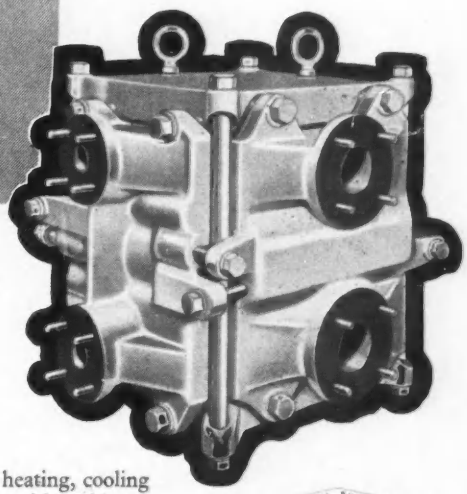

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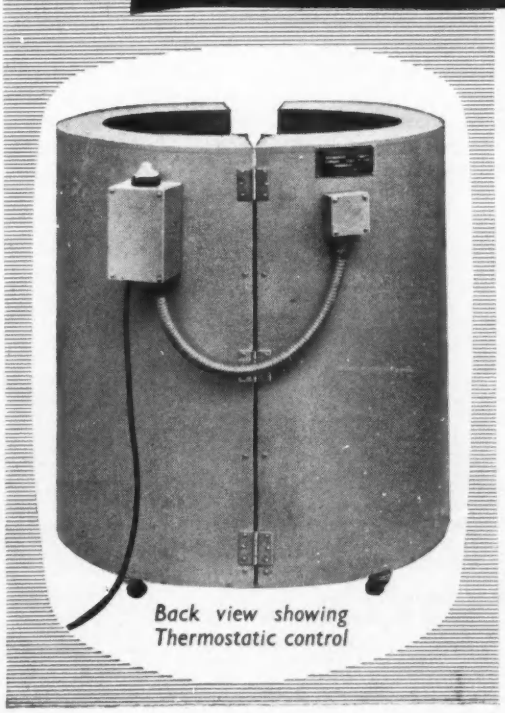

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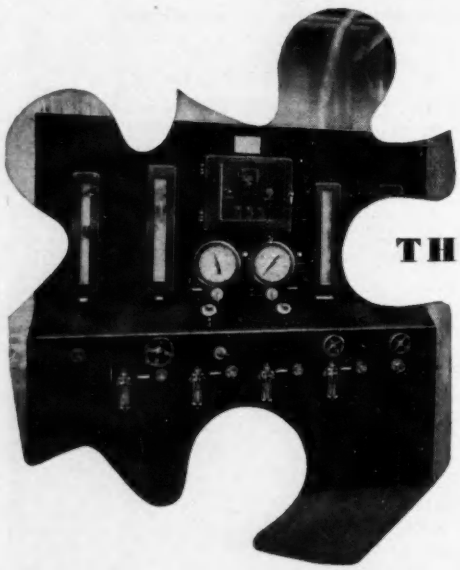

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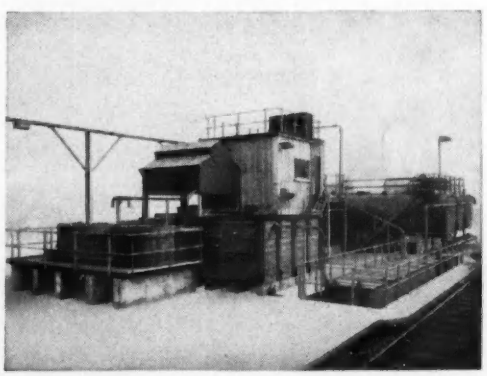

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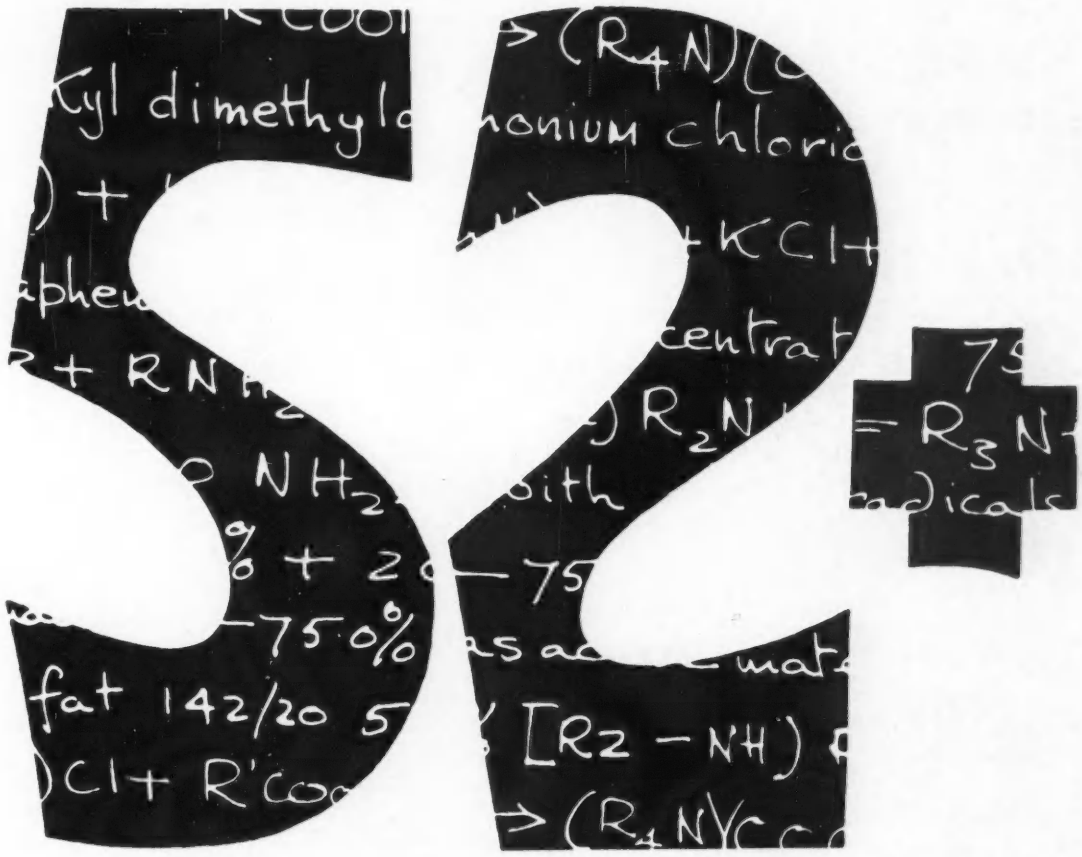

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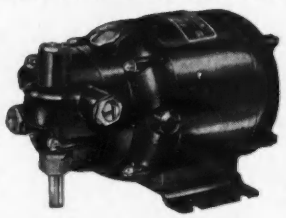

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R.P.M.	– TORQUE	R.P.M.	– TORQUE
600	10 oz. in.	37.5	4 lb. in.
300	16 oz. in.	25	4 lb. in.
150	24 oz. in.	18.8	4 lb. in.
100	32 oz. in.	12.5	4 lb. in.
75	36 oz. in.	9.4	4 lb. in.
50	3 lb. in.	6.25	4 lb. in.

SHADED-POLE INDUCTION GEARED MOTOR—Type 'FA'

R.P.M.	– TORQUE	R.P.M.	– TORQUE
216	4 oz. in.	13.5	24 oz. in.
108	7 oz. in.	9	30 oz. in.
54	10 oz. in.	6.7	35 oz. in.
36	12 oz. in.	4.5.	44 oz. in.
27	15 oz. in.	3.35	3 lb. in.
18	20 oz. in.	2.25	4 lb. in.

VARIABLE SPEED GEARED MOTOR—Type 'KQ'

R.P.M.	– TORQUE	R.P.M.	– TORQUE
200-600	9 oz. in.	12-37.5	4 lb. in.
100-300	16 oz. in.	8-22	4 lb. in.
50-150	20 oz. in.	6-16.5	4 lb. in.
32-100	32 oz. in.	4-11	4 lb. in.
25- 75	40 oz. in.	3- 8.25	4 lb. in.
16- 50	48 oz. in.	2- 5.5	4 lb. in.

CAPACITOR INDUCTION GEARED MOTOR—Type 'N'

R.P.M.	– TORQUE	R.P.M.	– TORQUE
456	8 oz. in.	28.5	3 lb. in.
228	13 oz. in.	19	4 lb. in.
114	21 oz. in.	14.2	4 lb. in.
76	26 oz. in.	9.5	4 lb. in.
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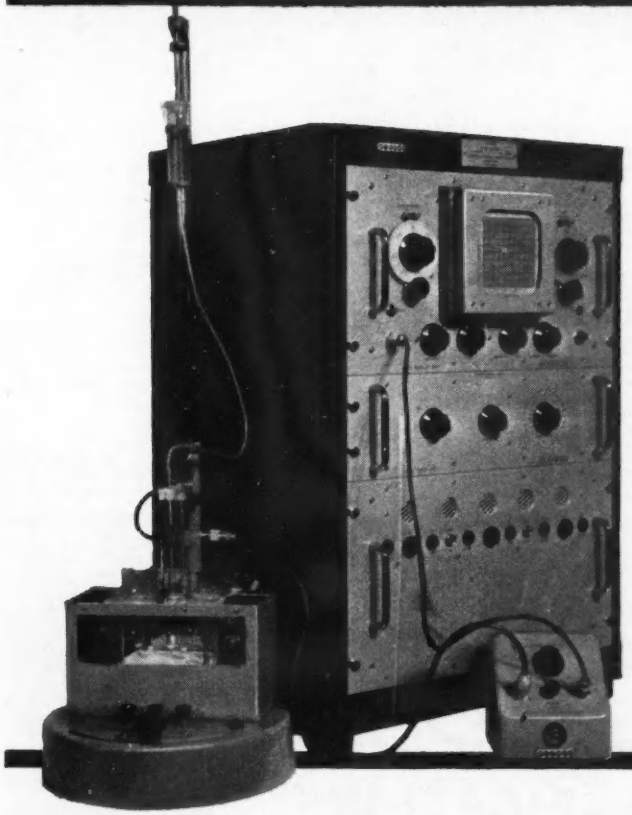

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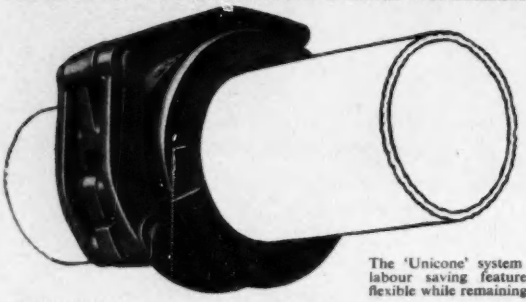

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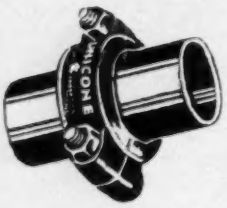

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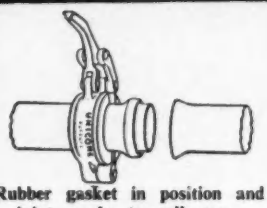
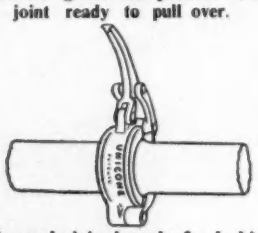
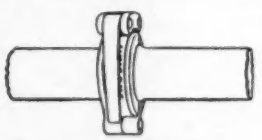


Rubber gasket in position and joint ready to pull over.



Pipe ends joined ready for locking.



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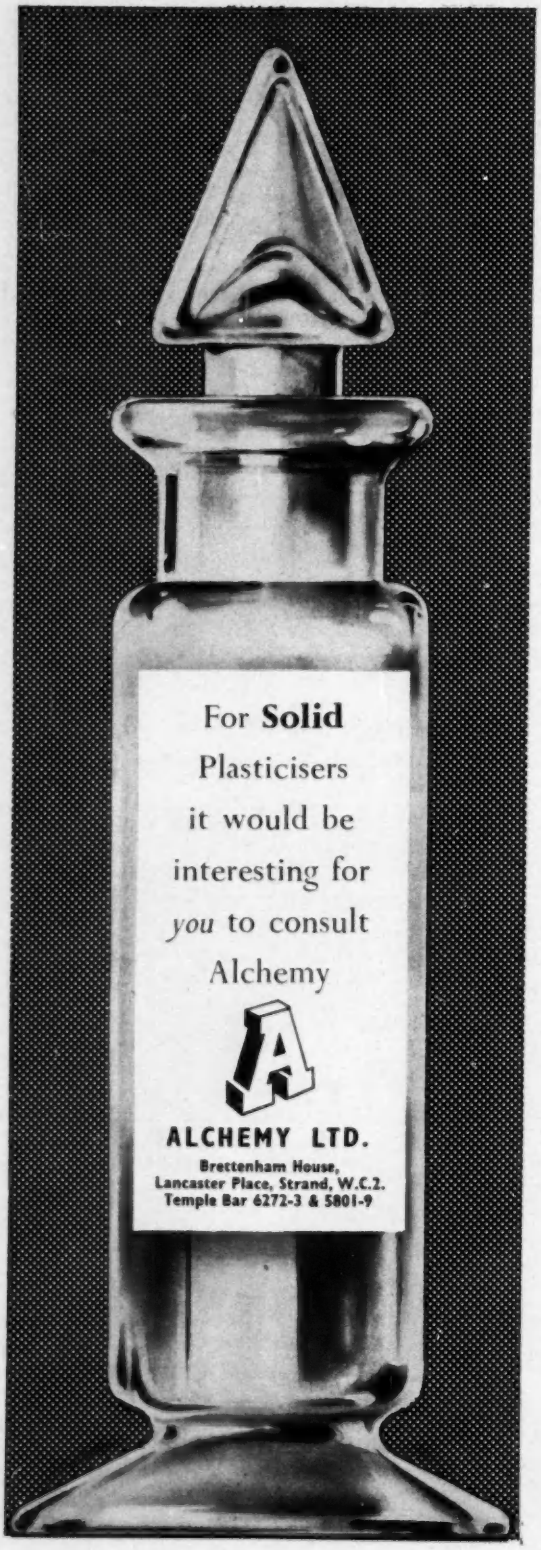

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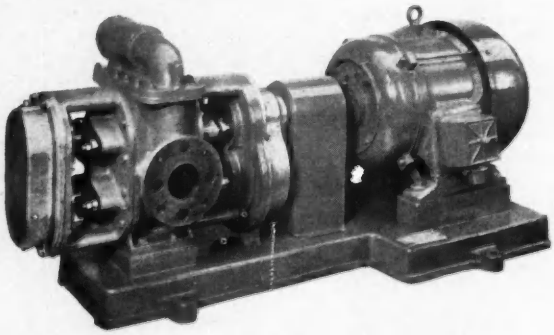

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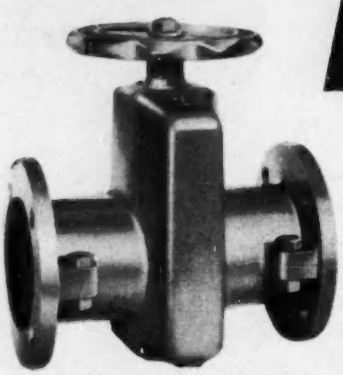

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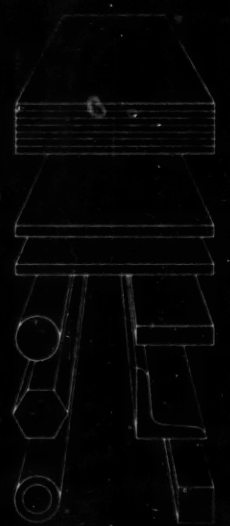

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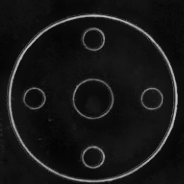

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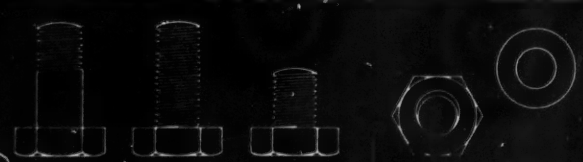

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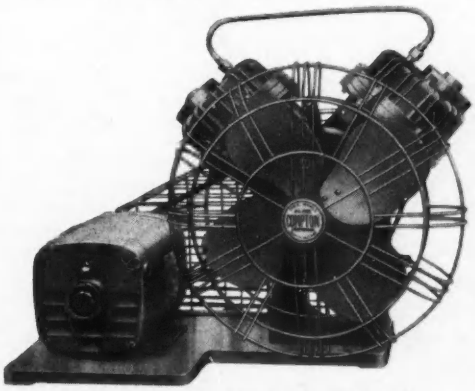

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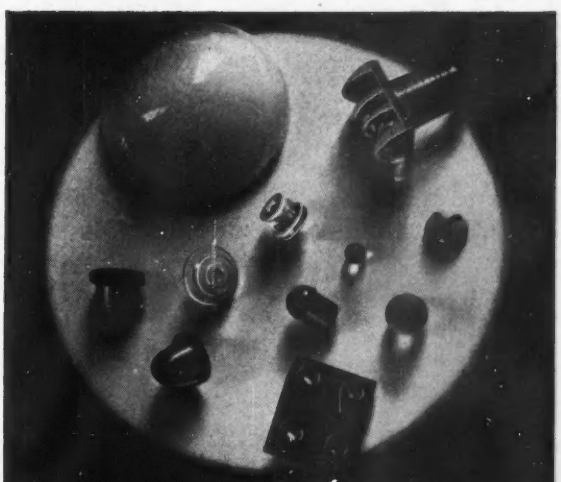

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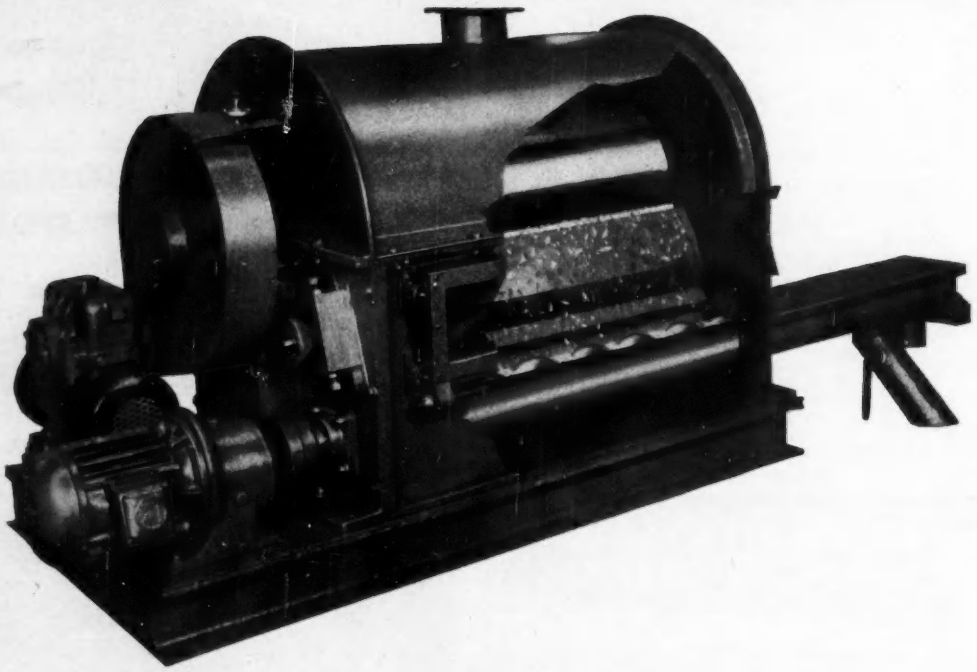

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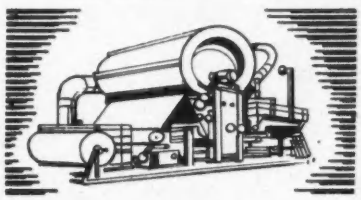

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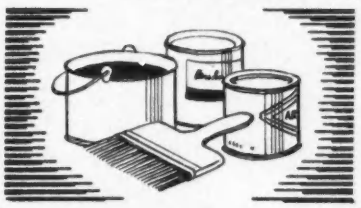

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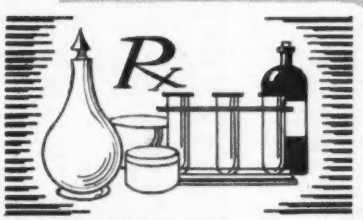

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CHEMICAL AGE

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PROSPECTS FOR 1959

THE British chemical industry in 1958 showed itself to be as strong and as progressive as in the past few years. It also ably demonstrated its resilience in the face of adverse economic conditions and in fact was able to show a commendable overall increase in production as compared with 1957. The rate of investment in new plant and in research and development—the key to the industry's future prosperity—continued at a high rate, a factor which will pay dividends in the coming year.

Naturally experience differed widely in the varying sections of the industry, but chemical production in 1958 was largely affected in the inorganic section, always a sensitive barometer of the general economic situation. There is even a suggestion of unused capacity here at the present time. On the whole, the industry was sustained by the organics which held their own, at a time when industry generally was experiencing a minor recession. The effect of the newly developed indigenous petrochemical industry, now getting into its stride, has been particularly noticable, by virtue of the organic chemicals it has placed on the home market.

As restrictions are lifted and conditions made easier by the Government's more relaxed attitude to industry, it is anticipated that the latter half of 1959 should witness more expansion. At any rate, chemical manufacturing industry is expected to achieve a similar output to that of last year. Output of inorganics is expected to show some improvement and production of the organics, notably petrochemicals, should increase substantially more than in 1958. Overall a 3.5 to 4 per cent increase in the chemical industry's rate of growth is forecast by the Economist Intelligence Unit. All these factors are dealt with in the many special articles in this Annual Review and 1959 Preview issue of CHEMICAL AGE.

Prospects in the fertiliser field are bright for, despite reducing profit margins on crops and products, farmers are not only maintaining but in many instances, are increasing, rates of fertiliser use. They are now realising that lower costs of production are coupled with higher yields per acre. At the same time, surveys carried out during the past year reveal that large acreages of farmland and grassland receive no fertiliser. In Scotland fertiliser rate and frequency of application exceed that in England and Wales.

With regard to developments in fertiliser manufacture and the introduction of new compound fertilisers, 1958 must be regarded as a 'quiet,' unspectacular year.

British plastics production will have broken another 100,000-ton mark this year. The percentage increase, however, appears to be slowing up. Despite the emphasis on p.v.c., polythene and polystyrene, production and sales of which have been outstanding, few, if any, of the traditional plastics are showing any decline. Those notable early plastics celluloid and casein are continuing to hold their own. The present year will undoubtedly see the introduction, in a small way possibly, of some of the recently announced plastics, such as polyformaldehyde (Du Pont's Delrin) and polycarbonates (Bayer A.G. of Germany and G.E.C. of the U.S.). Polypropylene has recently been made available in limited quantities through

Shell Chemical Co. It remains to be seen whether there are any plans to manufacture this plastics material in the U.K. Difficulties with regard to the present patent position and Montecatini-Ziegler licensing arrangements are apparent (CHEMICAL AGE. 13 December 1958, 980 and 27 December 1958, 1052). Another telling point here must be 'Is this the right new polyolefin to develop in the U.K.?' (CHEMICAL AGE, 13 December 1958, 980). Also to be borne in mind is the fact that much emphasis has been laid on the use of polypropylene for synthetic fibres and textiles. Again, this poses a question, for there is continued strong competition between nylon, Terylene, and acrylic fibres.

In the synthetic rubber field it seems probable that more will be heard about copolymers of ethylene and propylene.

Dr. Yarsley (Yarsley Research Laboratories Ltd.) considers plastics progress in 1958 and other aspects of the industry in page 81.

From the exclusive CHEMICAL AGE survey of sales in 1958 (p. 73), it will be seen that the companies participating are optimistic about 1959. It is widely believed that the better trading conditions experienced towards the end of 1958 will continue through 1959. There is no doubt, however, that if the economic climate is likely to be easier, competition will, if anything, become stiffer as the European Common Market develops.

The drop of £4 million in chemical exports in January-November 1958 is a disappointment, but this is not as bad as it appears. 1957 was a record year for U.K. chemical exports and the industry's performance under the conditions of 1958 was highly praiseworthy. Towards the end of the year, exports had started to rise again and there is no doubt that manufacturers will do their utmost to maintain their position in existing markets in 1959 and will continue to seek out new markets.

Mr. H. W. Vallender, examining the changes which have taken place in the industry's chemical exports, indicates in page 75 that one of the reasons for the fall in chemical exports has been the growing demand for chemicals by the U.K.'s secondary manufacturing industries. The industry has also had to face import restrictions in India and currency difficulties in the Argentine and should these continue on a still more restrictive scale this would have quite a significant effect on 1959 exports.

It is heartening to note that exports to the dollar area have increased slightly during the past year.

The present trend of declining chemical exports, the Economist Intelligence Unit considers (see page 77), is unlikely to continue throughout the coming year and a moderate increase in chemical exports is suggested. Other observers, however, feel that U.K. chemical exports could fall further in the near future as primary producing countries continue to cut back their imports. Only an increase in sales to the industrialised countries, it is suggested, can prevent a fall in U.K. overseas trade.

Manufacturers are making every endeavour to keep export prices stable, as narrowing profit margins indicate; a different trend was recorded in the years between 1954 and 1957 when they rose by 11%.

The U.K. is expected to benefit from the 10% reductions in tariffs which are being made to it and all the O.E.E.C. countries outside the Common Market, where the present tariff is above the level of the eventual tariff wall.

U.K. exporters will be at a disadvantage however, in the Benelux countries where tariffs are lowest and below the average, although these will be reduced to France, Germany and Italy. The disadvantage this year is expected to be small, but if a Free Trade Area is not developed, the internal tariffs will continue to fall until by 1961 the U.K. will have to face the rising external tariffs of the Benelux countries.

If U.K. manufacturers consider that a Free Trade Area will come into existence shortly, they will have to make very determined efforts to retain their markets even at the cost of reducing prices and hence narrowing still further their profits. Should it be considered that the competition from other producing countries, in particular West Germany, will rise steeply the industry may feel that it is preferable to sell as much as possible at existing prices. To overcome the difficulties of the situation, tie-ups with companies in Europe would follow with manufacture taking place in the country of sale. (See CHEMICAL AGE, 3 January, 10.)

Competition may increase also, the A.B.C.M. spokesman suggests, as a result of the recently announced measures allowing conversion of sterling to dollars and other currencies.

Faced with a seeming deadlock in the negotiations, as well as with Free Trade Area currency problems, import restrictions and the vagaries of home demands, the future for 1959 is difficult to predict. The note struck by the chairmen of various chemical companies in recent annual reports has been one of cautious optimism, with which CHEMICAL AGE concurs.

1959 PLANS FOR POLISH CHEMICALS

THE Polish Ministry for the Chemical Industry recently outlined results of this year's work, and plans for next year. So far as can be judged, the plan for 1958 will in fact be fulfilled by about 102%; productive capacity went up during the year by 2 milliard zloty, and labour productivity is 11% up on 1957. Looking to 1959, the overall production of the industry is expected to rise by 13% on this year—a faster rate than the average for the whole of the country's industries. The value of the products will be approximately 22 milliard zloty.

Within the industry, certain products are scheduled for rapid development. This applies particularly to plastics materials. Production of p.v.c. will be 50% up on 1958, and the first 2,000 tons of polystyrene will be produced while installations will be built to increase polystyrene production to 5,000 tons. Production of plastics per head of population in 1958 was 0.8 kg; next year the figure will be 1.3 kg.

Next year the Oswiecim synthetic rubber factory will begin production, with an output in the region of 1,000 tons; when in full production, production will rise to 36,000 tons a year, and ultimately it should be possible to replace imports. Expansion of the synthetic textiles industry will be aided in 1959 by the import of machinery from the U.S. and East Germany.

The pharmaceutical industry is to begin production of streptomycin and other antibiotics, as well as vitamins B6 and B12. In the dyestuffs industry, emphasis will be on improvement of quality; weight of production will be only 3% up on 1958, but value will be 18% greater.

A further development in exports is planned for 1959. This year, it was planned originally to export chemicals to the value of 102 million roubles, but exports will in fact be over 164 million roubles for the year. This is the first year when finished products have been exported.

Investment in the chemical industry in 1959 will be 17% higher than in 1958. Apart from the projects mentioned above, the Kedzierzyn fertiliser plant is to be expanded; in the new section coke-oven gas will be utilised, a step which will permit the reduction of investment outlay by 20% and will reduce the cost of the fertiliser produced by 30%.

ANNUAL REVIEW & 1959 PREVIEW

C.A. SURVEY SHOWS THAT INDUSTRY IS OPTIMISTIC ABOUT TRADE IN 1959

TOTAL sales by the U.K. chemical industry were higher in 1958 than in the previous year. In many sections of the industry turnovers remained static, a few experienced depressed conditions and a few, notably petrochemicals, made spectacular progress.

These trends are disclosed as a result of the exclusive *Chemical Age* survey of sales in 1958 and prospects for 1959. These results confirm the trends shown in the first survey published in *Chemical Age*, 11 January 1958, when it was stated by the companies then reporting that the expansion rate in sales of British chemicals would slow down during 1958.

This second survey shows that companies taking part generally expect the better trading conditions experienced in the latter part of 1958 to continue through 1959. Competition is expected to be keener in all sections of the industry this year, but even so it is anticipated that total sales will rise more than they did last year.

The note throughout most sectors is one of cautious optimism and it seems that 1959 will not be a year of spectacular growth but one in which the sales curve should rise steadily. 1959 will, it appears, again be a year of fairly heavy investment, many companies indicating that they think the time is ripe to reinstate building projects held up in 1958 because of unfavourable financial conditions.

A number of companies also anticipate that their heavy capital investments in 1957 and 1958 will bear fruit in the coming 12 months. As it was new projects and new products are stated by many to have helped them maintain their positions during 1958; without them some producers say they would not have reported increased sales.

Good Augury for Exports in 1959

Export experience differed widely from section to section and some companies noted the improvement in chemical exports in the closing months of 1958. This, it is felt, augurs well for exports in 1959, when many companies hope to improve their export rating in the industrialised countries.

The questionnaire on which the CHEMICAL AGE survey is based went to all producers of chemicals and allied products and more than 17% completed and returned the forms, compared with just over 12% last year.

Companies were asked to state the percentage increase or decrease of (a) total sales over 1957; (b) exports over 1957; and (c) the percentage rise or fall in total sales expected in 1958 (only 9% felt that conditions were too difficult to make an estimate). They were asked, if 1958 sales were higher, whether the increase was due to (a) extension of facilities, or (b) new products.

In reply to a question asking for percentage increase or decreases in investment on replacements, extensions, new plant, and research and development, it was clear that for most companies there was 'no change', a few said they had made major investments in 1957 and of those replying 25% increased investment in replacements, 34% in extensions, 42% in new plant and 37% in research and development.

Finally, companies taking part were asked if they intended to reinstate any investment projects in 1959 (19% said they would) and or if they were planning any entirely new projects this year (43% said they were).

It will be seen that actual sales values were not requested. It should be stressed that the results of this survey, analysed below, do not indicate precise percentage increases in the sales of each section of the chemical industry; they represent average company performances expressed as a percentage based on the number of forms returned. Essentially they are a guide to trends.

British Chemical Industry Sales Analysed by Sections

● **Heavy Chemicals.** Basic inorganic chemicals were affected by general industrial trends and sales of many products showed little change compared with 1957. The bulk petrochemical industry, however, continued its expansion at a higher rate than in 1957. The average increase in heavy chemical sales of 17.8% over 1957 by companies returning our forms includes not only plants that operated at periods below capacity, but also a number of firms in the synthetic organic field where production was substantially higher than a year ago.

Exports of the companies replying rose on average by 26.15%. So far as 1959 sales are concerned, the companies express cautious optimism, expecting an increase of 13.9%; one company expected a decrease; two anticipate 'no change' and two said that conditions were such that it was not possible to make any estimate.

Of the companies replying, just over one-third said they had introduced new products during the year; and 20% had either experienced an extension of uses, or had found new customers. One-third reported extensions to their plants. Investment expenditure compared with what was spent last year rose as follows: Replacement, up 2.1%; extensions, up 6%; new plant, up 16%; research and development, up 1.2%. Of the companies replying, 42% said they would invest in new projects in 1959.

U.K. production of sulphuric acid in the first nine months of the year averaged 171,300 tons a month, against a monthly average of 194,700 tons in 1957 and 187,200 tons in 1956. Consumption in the first nine months of last year averaged 185,500 tons a month, compared with 197,600 tons in 1957 and 187,700 tons in 1956.

U.K. consumption of sulphur and other materials used for sulphuric acid are shown below as monthly averages (for 1958 the figure is based on the first nine months):

Consumption

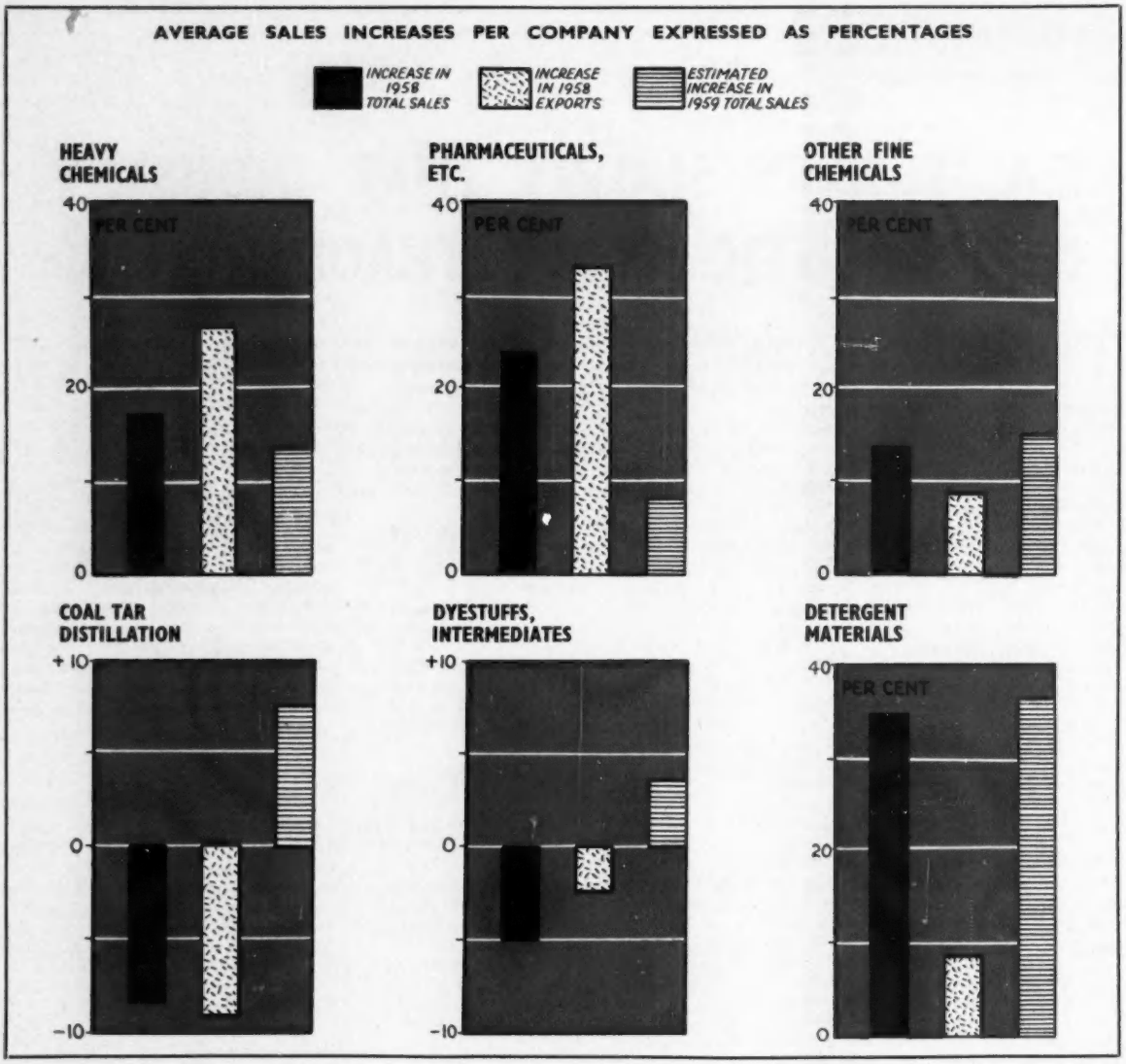
	Monthly averages in '000 tons		
	1958	1957	1956
Sulphur	25.7	27.7	24.3
Pyrites	28.0	30.6	32.8
Spent oxide ...	20.0	22.0	21.0
Anhydrite	60.9	61.4	57.5

Stocks

	Monthly averages in '000 tons		
	1958	1957	1956
Sulphur	82.1	97.2	84.6
Pyrites	210.5	245.7	212.2
Spent oxide ...	105.4	112.0	130.2

● **Fertilisers.** The number of fertiliser companies returning forms was too few to include in our survey. Of the main U.K. fertiliser companies, I.C.I., Fisons and Scottish Agricultural Industries, have reported that 1957-58 was a record fertiliser year. Consumption of the three main nutrients in 1957-58 (1956-57 in parentheses) was: Nitrogen 309,800 tons (302,000 tons); P_2O_5, 365,800 (369,600); K_2O, 348,100 (337,500).

U.K. consumption of nitrogen has increased with the Government subsidies, and for 1958-59 is expected to total



500,000 tonnes compared with 435,000 tonnes in 1957-58; production in 1958-59 is estimated at 545,000 tonnes, against 465,000 tonnes. Output, however, exceeds consumption and the industry views with concern the new plant capacity in hand in Europe. The tendency has been to reduce production.

U.K. production and consumption of fertilisers is shown in the following tables:

NITROGENOUS FERTILISERS*
(N content)

	Monthly averages in '000 tons		
	1957-58	1956-57	1955-56
Production	28.46	27.50	25.37
Home deliveries ...	25.82	25.17	24.27
Exports ...	5.34	0.70	2.16

* Ammonium sulphate, Nitro-Chalk, c.c.f., and for U.K. deliveries, Chile nitrates of soda and potash, trail ammonium phosphate, ammonium nitrate, nitrate of lime and cyanamide.

OTHER FERTILISERS

	Monthly averages in '000 tons		
	1958	1957	1956
Compound fertilisers*			
Production ...	195.2	194.1	178.7
Consumption ...	199.2	190.0	171.8
K_2O content of potash*	29.01	28.13	27.37
Liming materials ...	440.6	565.0	539.5

* Based on years ending 30 June.

PHOSPHATIC FERTILISERS

1. Production (P_2O_5 content)

	Monthly averages in '000 tons		
	1957-58	1956-57	1955-56
Total	27.5	29.2	29.8
Superphosphate ...	12.1	14.7	14.7
Ground basic slag ...	6.7	6.8	6.8
Ground phosphate	1.3	1.5	1.8
All others* ...	7.4	6.2	6.5

2. Consumption (P_2O_5 content)

Total	30.5	30.8	32.2
Superphosphate ...	12.6	14.4	15.0
Ground basic slag ...	8.6	8.5	8.3
Ground phosphate	1.4	1.5	1.9
All others* ...	7.9	6.4	7.0

* Organic fertilisers, treated phosphate rock, c.c.f. and triple-superphosphate.

● **Petrochemicals.** U.K. production of petrochemicals continued to expand. 1958 saw new ethylene and butadiene capacities on stream by Esso at Fawley. In addition, British Hydrocarbon Chemicals started site preparation for their new ethylene unit which will more than double their existing Grangemouth capacity. I.C.I. plants that will come into operation this year will provide ethylene (up to 100,000 tons/year), propylene and C_4 olefins, oxo alcohols, at Billingham and ethylene glycol at Wilton. Union Carbide also have an ethylene oxide, glycol and derivatives (20,000 tons/year) plant due on stream towards the end of the year at Fawley, and the new Shell Chemical ethylene oxide (20,000 tons/year) plant is due in shortly.

Output of petrochemicals rose by 19% during 1958 and is likely to rise even more steeply during 1959, far outstripping other sectors of the industry. In the first 10 months of last year, feedstock for petrochemical plants climbed to a monthly average of 72,700 tons, compared with a monthly average of 66,100 in 1957 and 55,500 tons in 1956.

● **Plastics and Allied Materials.** Output of all plastics materials rose by 3% during 1958, the increase for thermosetting materials being 0.6% and that for thermoplastics, 3.8%. Many new materials are under development, but may not reach the market for a few years. Among products new to the U.K. chemical industry in 1958 was polypropylene, introduced by Shell Chemicals and

(*Continued on page* 78)

ANNUAL REVIEW &
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BRITISH CHEMICAL EXPORTS IN 1958

Year-end Recovery May Bring 1958 Total up to the Record Level of 1957

U.K. Exports for January to November 1958 were down by £4 m., but there has been an appreciable increase in the past few months. It is pointed out in this special article that the growing demands of the secondary manufacturing industries must have first call on the U.K. chemical industry.

By
H. W. VALLENDER,
Association of British Chemical Manufacturers

IN the review published last year, reference was made to the steady growth in the export of chemicals since 1947 and it was particularly noteworthy that there was an increase in 1957 of some £23 million as compared with 1956. This increase was part of a general increase in exports by most U.K. manufacturing industries and during that period chemicals accounted for just under 10% of the value of all manufactured exports.

The situation in 1958 for industry as a whole is substantially different. There have been appreciable decreases in exports by the major manufacturing industries with the notable exception of road vehicles and aircraft. In spite of a large increase on their part, the total value of U.K. manufactured goods exported fell by some £54 million and for the period of January to November 1958 chemical exports were down by £4 million.

The rate of chemical exports, however, during the last few months has shown an appreciable rise and it may well be that when the figures for the whole of the year are available that exports will be virtually the same as for 1957.

Before examining the changes which have taken place within these overall figures, it should, however, be mentioned that the rate of capital investment in 1957 which amounted to £128 million was likely to be repeated during 1958, and from plans which have already been announced it seems that the rate of capital investment in future years may well exceed this figure.

The decreased rate of exports in the early part of 1958 is paralleled by changes in the index of production which is based on 1954=100: the index in 1957 was 115 falling in early 1958 to 113 but by October 1958 having reached a new record level of 122.

In considering exports of chemicals from the U.K. it must also be borne in mind that there is a growing demand for chemicals by the secondary manufacturing industries whose legitimate demands must always be a first call upon the industry. The growing demand for organic chemicals, and in particular for plastics raw materials will undoubtedly have an effect upon export performance, although this is not to suggest that the industry underrates the importance of increasing exports.

Pattern of Exports. When one examines the general distribution of chemical exports it can be seen from the accompanying table that there has been very little change in the values sold to the main currency areas of the world. The Sterling area still accounts for some 48% of total exports and although there has been little variation between the overall figures for the Commonwealth, it is significant that exports to India have fallen by some £4½ million due largely to the restrictions on imports which were necessitated by the Indian financial situation.

While exports to Canada, South Africa and Australia have been maintained, figures for New Zealand in particular show an increase which has tended to balance

Distribution of U.K. chemicals in 1958

DISTRIBUTION OF U.K. EXPORTS OF CHEMICALS 1956-1958 IN £M

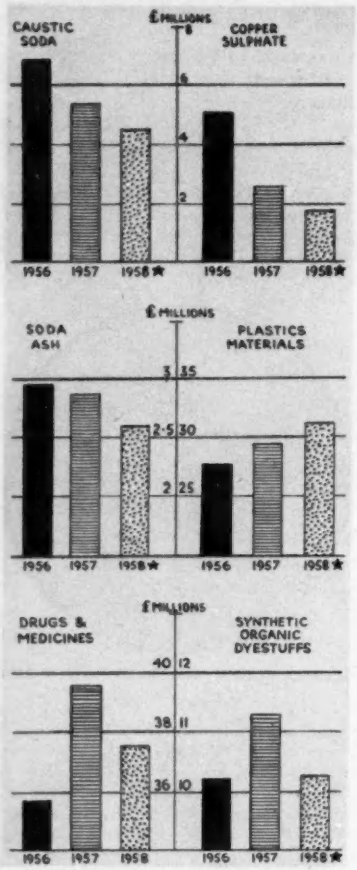
	1956 £m	1956 World Total %	1957 £m	1957 World Total %	1958* £m	1958* World Total %
Sterling Area						
Total	118.3	48.4	130.6	49.1	127.1	48.3
Sterling Commonwealth	64.2		79.5		78.1	
U.K. Colonies	37.3		31.5		31.8	
Middle East	15.5		16.2		15.9	
Non Sterling O.E.E.C. Countries and Possessions						
Total	67.1	27.4	73.9	27.6	72.9	27.7
E.C.S.C. Countries	37.7		42.5		41.8	
Dollar Area						
Total	23.8	9.7	21.3	7.9	23.3	8.9
U.S.A.	8.6		7.3		7.7	
Canada	8.3		8.5		8.6	
Dollar Latin America	6.2		6.0		6.6	
Rest of World						
Total	35.0	14.3	39.4	14.7	37.9	14.4
Non-dollar Latin America	8.6		10.8		9.3	
Soviet Eastern Europe	2.2		2.9		4.0	
Grand Total	244.5		267.4		263.0	

* Estimates based on first 10 months' figures.

Source: Trade and Navigation Accounts

British Chemical Exports in 1958

Some Principal Chemical Exports



* *Estimated*

the figures as compared with the previous year. The figures for the Middle East remain static and these include an appreciable rise in exports to Egypt.

A similar picture emerges for Europe, where Common Market countries have again accounted for some 15.6% of our exports with a further 12.3% for the other members of O.E.E.C. While there has been little change in the overall exports to the E.C.M. countries, it is notable that exports to West Germany have increased by approximately £2 million. It might be mentioned here that our imports from Germany of chemicals are second only to that of the U.S. and amount to some £20 million for the year.

With the negotiations which have been proceeding for the establishment of the Common Market and of the Free Trade Area, it is natural to speculate about the possibility of increasing our exports to Europe in the coming years.

Certainly Europe is an area where purchasing power is rapidly developing, industrialisation is progressing and where therefore it may be expected that chemical consumption will increase. With the present suspension of negotiations it is difficult to make predictions as to the future but in spite of the application of the duty reductions and quota increases by the 'Six' to other members of O.E.E.C. it must be stated that for the hitherto unliberalised sector, discrimination started on 1 January in that at the moment the non-Six will not have access to the quotas equivalent to 3% of national production which are laid down in the Treaty of Rome. It therefore remains to be seen whether the high level negotiations which are due to be resumed, will remove these difficulties.

Turning to the dollar area our exports have been slightly increased as compared with 1957 and account for some 9% of the total. The difficulties of selling in these markets need not be mentioned here whether one is considering the U.S. itself, Canada or the open markets of dollar Latin America. In the remainder of South America there has unfortunately been a fall in exports to the Argentine, again due to currency difficulties.

U.K. EXPORTS TO E.C.M. COUNTRIES

	1956 £m	1957 £m	1958* £m
Belgium	6.1	6.6	6.2
France	7.7	8.6	7.5
Germany	6.2	8.5	10.5
Holland	8.9	10.0	9.9
Italy	8.8	8.7	7.6
	37.7	42.5	41.8
% of World Total	15.4	16.0	15.6

U.K. EXPORTS TO POTENTIAL F.T.A.

	1956 £m	1957 £m	1958* £m
Austria	1.1	1.2	1.0
Denmark	4.6	4.8	5.0
Greece	1.3	0.9	1.0
Irish Republic	6.6	6.8	7.1
Norway	3.7	4.2	4.6
Portugal	2.1	2.6	2.8
Sweden	6.7	7.3	7.4
Switzerland	3.2	3.2	3.0
Turkey	1.2	1.2	0.9
	30.5	32.2	32.8
% World Total	12.4	12.0	12.3

*Estimates based on first 11 months.

MAIN U.K. CHEMICAL EXPORTS

	1957 £m	1958* £m
Copper sulphate	2.4	1.7
Sodium hydroxide	5.3	4.3
Sodium carbonate	2.9	2.6
Carbon blacks	2.8	2.9
Compressed gases	2.3	2.6
Sulphonamides, not prepared	1.1	1.2
Crude chemicals from coal, petroleum and natural gas	3.8	2.9
Synthetic detergents	7.7	6.4
Synthetic organic dyestuffs	11.3	10.2
Paints, pigments and varnishes	24.1	23.8
Drugs, medicines	39.6	37.6
Vitamins	3.1	2.5
Antibiotics	8.8	8.3
Fertilisers	4.0	5.6
Plastics materials	29.9	31.8
Explosives	10.5	10.6
Pesticides	6.4	5.6
Tetraethyl lead compounds	11.9	11.1
Total U.K. Chemical exports	267.4	263.0

* Estimates based on first 11 months
Source: Trade and Navigation Accounts

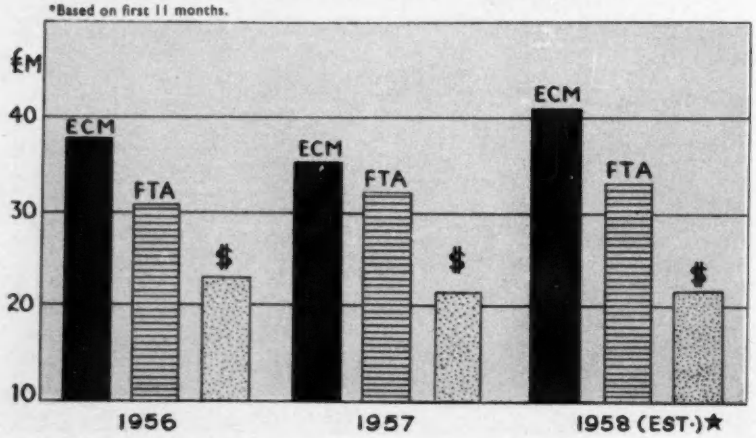
Turning to the U.K. statistics for individual chemical exports are not sufficiently detailed to allow comprehensive analysis. It must, however, be noted that there have been decreases in the exports of sodium hydroxide, sodium carbonate, crude chemicals from coal and petroleum, detergents and dyestuffs. In addition export of drugs have fallen some £2 million principally among vitamins and antibiotics. On the other hand there has been an increase for nitrogenous fertilisers of £1.6 million and of plastics of £2 million. It is not possible, however, to analyse the variations which may have taken place between these broad headings.

Future Prospects. It is never easy to forecast the prospects in this industry. In particular the reintroduction of licensing control on a more restrictive scale for countries such as India and Australia would have quite a significant effect in 1959. Competition may increase as a result of the recently announced measures allowing conversion of sterling to dollars and other currencies. In addition to this, the U.K. chemical industry faces growing competition from many other producers, in particular Western Germany. West German chemical exports on a basis comparable with the U.K. figures were £322 million in 1957 and, based on the latest available figures, rising to an estimated £346 million for 1958.

The situation in Europe is still unresolved and these factors make it virtually impossible to make predictions. This much, however, can be said: the U.K. chemical industry continues to invest in new plant and equipment and is vitally concerned in the export field and will endeavour, within the limitations placed upon it, by external factors, to improve its performance in 1959.

Exports to European Common Market, Free Trade Area and Dollar Area

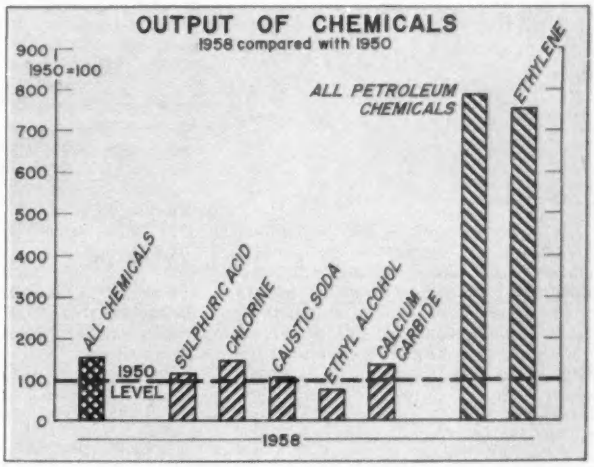
*Based on first 11 months.



PROSPECTS FOR U.K. CHEMICALS

Petrochemicals to Expand at Faster Rate: Heavy Inorganics to Retain Position

By
The Economist Intelligence Unit



DYNAMIC increases in chemical output have become such a familiar feature of the economic scene in Western Europe since the war that by now they are almost taken for granted. It is perhaps rather too easy to forget how impressive and important the performance of the chemical industry in the United Kingdom has been, and the graphic presentation in Chart 2 may serve to restore a sense of perspective.*

The chart compares the volume output of the chemical industry with that of all manufacturing industry over the last eight years, in terms of index numbers, with a further comparison of chemical and total exports. The resultant graphs are explicit enough, but conceal the fact that expansion has largely been concentrated in one branch of the industry. A closer look at some individual sectors is more revealing.

Heavy Chemicals.—Examination of the output of the basic inorganic chemicals over a period of years soon discloses that they are, on the whole, a sensitive barometer of the industrial climate. They tend to follow—with somewhat exaggerated movements—the scale of manufacturing industrial production, rather than the steady, upward movement of total chemical output. There are some obvious exceptions, notably chlorine and calcium carbide, which have important applications as intermediates in the organic field. In the case of chlorine this has caused a far more rapid expansion than for other inorganics, while calcium carbide shows a similar, but gentler, upward trend.

Clearly, the reason for the sustained buoyancy of chemical manufacturing lies in the organic sector and, as might be expected, is to be found in the spate of new materials produced by the development of an indigenous petrochemicals industry. The real size of the flood can be seen in Chart 1, which sets the expansion of chemicals from oil since 1950 against the progress of other heavy chemicals and of the industry as a whole. Here again, indices based on 1950 are the yardstick. Those for "all petroleum chemicals" are calculated from the tonnage of carbon content, and the remainder, including ethylene, are derived from the volume of actual products.

It should be borne in mind that this direct comparison of 1958 with 1950 is something less than fair to those chemicals whose output fell sharply in 1958. Of these, the 1957 level gives a truer picture and the relevant figures appear in Table 1.

TABLE 1
Index of output, 1957 and 1958
1950 = 100

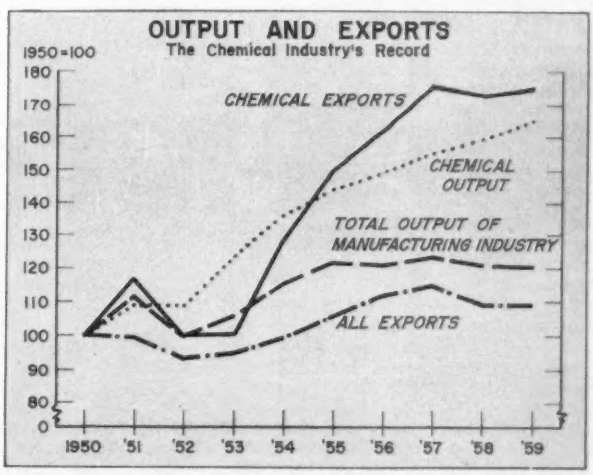
	1957	1958	Change 1957 to 1958 %
All chemicals	155	159	+2.6
Sulphuric acid	129	115	−10.8
Chlorine	155	144	−7.1
Caustic soda	125	102	−18.4
Calcium carbide	129	135	+4.7
Ethyl alcohol	110	75	−31.8
All organic petro-chemicals	664	789	+18.8
Ethylene	644	753	+16.9

These statistics also serve to illustrate the short-term changes which have affected chemical production in 1958. With the exception of calcium carbide, for which the 1958 figure is in any case very tentative, the heavy inorganic materials all suffered from the general economic doldrums. Of the organics, ethyl alcohol occupies a special position in that it made from both petroleum and imported molasses, and is fairly easy to store. Output is in consequence affected as much by the availability and price of molasses as by the level of demand. The unchecked growth of petrochemicals stands out the more boldly by contrast.

Unused Capacity

The unused capacity which must at present exist in the inorganic field is in fact somewhat greater than the figures above suggest, since some new plant has come into service, notably, an electrolytic chlorine unit which has increased the country's total capacity by about 5%, with a corresponding addition to capacity for the co-product, caustic soda.

End-products.—The output pattern of heavy chemicals is reflected in that of the group of major end-products in Table 2.



* In this article all the figures for 1958 and 1959 are estimated, as are some of those for earlier years.

Here again, index numbers with 1950 as the base year have been used.

TABLE 2
Output of chemical end-products
1950 = 100

	1957	1958	Change 1957 to 1958 %
Plastics:			
thermosetting	162	163	+0.6
thermoplastics	446	463	+3.8
all plastics	254	259	+2.0
Synthetic rubbers* ...	2,215	2,395	+8.5
Synthetic textiles ...	670	870	+30.0
Synthetic detergents ...	317	300	−5.4
Fatty acid soaps	69	70	+1.4
Paints and varnishes ...	112	—	—

* Consumption

In the years since 1950 the derivatives of 'traditional' materials — thermosetting plastics, soaps, and paints and varnishes— have at best grown in step with the industry and at worst declined steeply, as in the case of fatty acid soaps, which suffered the onslaught of synthetic detergents. Conversely, the newer products, based largely on petroleum chemicals have grown rapidly. Within this latter group, synthetic rubber has only recently gone into large-scale production in the U.K., hence the use of consumption figures in the table above, although even these show an exaggerated trend on account of the very small amount used in 1950.

Developments in 1958 follow in general the trends of the preceding years, but modified by the economic stagnation, with one notable exception—the reversal of direction apparent in soaps and synthetic detergents. The main impetus of the growth of detergents on the home market was spent by 1955 and exports began to fall in 1957. Conversely, soap output ceased its rapid decline in 1955 and has since remained roughly static. If the market shares of soaps and synthetic detergents now become stabilised, as may well be the case, the balance will be markedly in contrast to that in the U.S., where detergents loom far larger and continue to make progress. The key to the British situation almost certainly lies in the large investment of soap and detergent makers in vegetable oil.

Future Outlook.—The evidence suggests that the fall in economic activity is ceasing, and that Government policies should provoke at least slight expansion in the latter half of 1959. Manufacturing industry should thus achieve much the same output as in 1958. In chemicals, this should be accompanied by static or slightly rising production of heavy inorganics and their derivatives, while output of petrochemicals is likely to increase by some 25 to 30% (i.e., substantially more than in the preceding year). From these prospects, it appears that total chemical output will increase its rate of growth, yielding a total at least 3.5 to 4.0% higher than in 1958. (See Chart 2.)

In the export field there are already slight signs of a resurgence, both in total and in the chemical sector. It consequently seems likely that the general decline in exports will be arrested in 1959, and that chemicals should resume their upward climb, albeit at a more modest rate.

New Facilities will Boost Output of P.V.C., Polythene and Polystyrene

Chemical Age Survey—continued from p. 74

initially made by them overseas and imported. I.C.I.'s new acrylonitrile plant at Cassel Works is now being erected.

U.K. polythene output at about 60,000 tons in 1957 is estimated at 75,000 for 1959, while the 1960 figure will, it is believed, top the 120,000-tons mark. Polythene capacity in 1959 is scheduled to be increased by 56,500 tons a year; new plants due on stream are B.H.C., Grangemouth, I.C.I. at Wilton, and Monsanto at Fawley. U.K. capacity for p.v.c. at about 63,000 tons in 1957, rose to just under 70,000 during 1958 and is expected to increase progressively, but not as spectacularly as polythene, during 1959 to reach a 1960 total of about 100,000 tons. Polystyrene output, placed at about 30,000 tons in 1957 has been rising steadily and should top the 50,000-tons-a-year mark by 1960.

● **Pharmaceuticals.** The companies returning our questionnaire report a 1958 average increase in total sales of 23.7% and an increase in exports over 1957 of 32.5%. Experience differed widely and the results of one company, which were abnormally high, have been omitted. Total sales are expected to rise by an average of 7.5% during 1959. A number of companies said they could not estimate sales trends in the coming year. Ten per cent of the companies replying extended their facilities during 1958 and their expenditure rose over 1957 as follows: replacement, up by 3%; extensions up by 20%; new plant up by 24.2%; research and development up by 20.1%. These figures include the particularly heavy expenditure of one company on all items, except replacements. Sixty per cent of the companies have new projects either in hand or at the planning stage.

● **Other Fine Chemicals.** Total sales of 'other fine chemicals' by those returning forms, rose by an average 14.4% in 1958, while exports were up by 8.5%. Only one company expected total sales to decline this year and for 1959 it is expected that sales will rise by an average of 14.7%. Half of the companies said that higher sales were due to new products while two said their turnovers rose because of new clients; 50% of those replying also said that extended production facilities had helped boost sales last year.

Increases in investment were recorded as follows: replacements, up 6.2%; extensions, up 3.4%; new plant, up 7.7%, research and development, up 10.7%. Half of the companies intend to invest in new plant in the coming year.

● **Coal Tar Products.** All the companies replying in this sector of the industry report lower sales in 1958; on average total sales were down 8% over 1957; exports were lower by 9%, despite the fact that two firms recorded appreciably higher exports. There is, however, a note of optimism about prospects in 1959. While two companies refuse to estimate how sales will react this year and one believes that its end-of-the-year figure will be the same as for 1958, other companies anticipate an average increase of 7.5%.

All companies replying except one report 'no change' in their investment during 1958; the 'odd man out' increasing his expenditure on extensions, new plant and research and development by 300% compared with 1957. Twenty-six per cent of the companies intend to go ahead with new projects during 1959. Companies whose annual reports were published in the latter part of the year referred to lower turnovers and decreases in production. The Gas Council report, published in October, placed crude tar output for 1957-58 at 1,830,200 tons against 1,920,000 tons for the previous period; sales were down from 1,501,200 tons to 1,435,200 tons. In some sectors sales were good, notably naphthalene, crude benzole, and xylol.

● **Dyestuffs.** The companies reporting in this sector were evenly divided between those whose sales increased during 1958 (top increase over 1957 being 6.5%) and those whose turnovers were down (the biggest drop being one of 17%). Taken together, the figures show an average decrease in 1958 total sales of 5.1% over 1957; exports were down by an average 2.75%. With one exception, companies reporting expect better things in 1959 and on average 1959 total sales are expected to rise by 3.75%.

Investment during 1958 was either lower than in the previous year or was reported to be the same so far as most of the companies were concerned.

● **Detergent Materials.** Companies reporting in this sector, although fewer than in most of the others, stated that sales continued to expand. Total sales increased by an average of 30%, while exports rose by an average of 8.5%. Varying forecasts are made for 1959, but the average increase in total sales expected is 35%.

All the companies replying brought new plants on stream last year.

● **Miscellaneous.** Returns in a number of chemical sectors have not been sufficient to report on comprehensively, but the following brief points might interest other companies in the fields concerned. *Fats*, etc.: Total sales down by an average of 9%, exports lower by 22%, 1959 sales expected to rise by 20%. *Plastics chemicals*: Total sales up by 25%, exports down by 40%; a further 25% increase in total sales looked for this year. *Synthetic Resins*: Total sales down 16%, exports lower by 33%, 1959 sales expected to rise by 5%. *Pesticides*, etc.: Total sales up by 18%; exports higher by 40%; and an optimistic 50% rise looked for this year.

We gratefully acknowledge the assistance kindly provided by the many companies which helped us to complete this survey

Prospects for Fertilisers

Ratio of U.K. Nutrient Consumption Moves Towards 1 : 1 : 1

By
D. P. HOPKINS
B.Sc., F.R.I.C.

ANNUAL U.K. consumption of the three main fertiliser nutrients for the past three years has been as follows:

	(tons of nutrient)		
	N	P_2O_5	K_2O
1955-56	291,300	385,800	328,400
1956-57	302,000	369,600	337,500
1957-58	309,800	365,800	348,100

It will be noted that potash tonnages are higher for 1955-56 and 1956-57 than the figures given in this similar annual review last year, but the potash consumption figures have been officially revised; 1957-58 figures are still somewhat provisional.

It would appear, however, that this year's fertiliser expansion, like last year's, has been small, and the lessened rise in nitrogen use, under 3%, might particularly be mentioned. Fairly heavy top-dressing use of nitrogen occurs in early spring and early summer, but these normal practices tend to be reduced in a dry early spring or in a wet early summer; both these weather conditions occurred in much of England last year, and this may well explain why nitrogen use has expanded by a smaller annual amount than usual. Certainly the monthly delivery figures for early spring months fell sharply below similar figures for 1957. It is reasonable to assume that nitrogen use would have shown a better stride forward if the weather had been more favourable.

It is important that phosphate consumption has scarcely changed at all after its setback two years previously. There is still a marked trend for advisers to recommend lower rates of phosphate dressing for some crops. Although most soil scientists would agree that expansion is not required for most arable crop dressings, it is open to argument whether reductions would be wise, certainly from a long-term viewpoint. Farming tradition for regularly using moderate phosphate rates is well established, and it is possible that tradition and the advisory influences towards reduction have now reached equilibrium. A decrease of under 4,000 tons of P_2O_5 over the year is much smaller than the previous drop of over 14,000 tons.

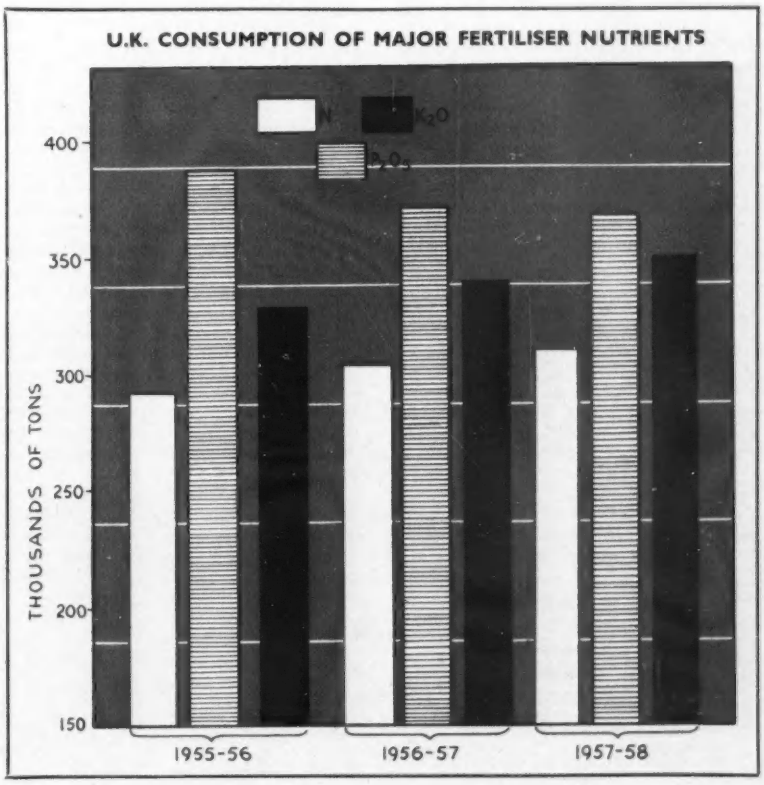
The continued and steady increase in potash use is surprising when nitrogen's advance has been so small. It is a sign that modern farmers are increasingly choosing balanced fertiliser dressings although there is no subsidy assistance for potash as there is for nitrogen and phosphate. The ratio of national N, P_2O_5, and K_2O consumption moves more and more surely towards a 1 : 1 : 1 standard; not many years ago the ratio was much closer to 1 : 2 : 1.

It is again confirmed, therefore, that most farmers, despite reducing profit margins on crops and products, are maintaining, and some slightly increasing, rates of fertiliser use, recognising that higher yields per acre generally mean lower costs of production.

Two 'paper' events of the calendar year, each recent, may well have expansive influences on future fertiliser use—the Small Farms Scheme, and the Grassland Utilisation Committee's report. Though the former will aid only certain types of small farm, outright grants of up to £1,000 over three to five years for farm expansion schemes approved by advisory services must in many cases bring higher fertiliser use; few suitable schemes will not include increased use. Additionally, farms waiting to be considered can immediately enjoy benefits in a supplementary scheme, one of these being a 75% addition to the present fertiliser subsidies.

The fertiliser impact of the main scheme and its supplementary one has already been estimated by the Government as likely to cost an extra £3 to £4 million a year. At the same time, the marginal production scheme has been withdrawn and this in some districts had been encouraging fertiliser use on poorer land; any loss of fertiliser orders through this must, however, be several times offset by gains in orders from small farms. In recent years various economic studies of small farms have shown that in general rates of fertiliser use are lower than on medium and large sized farms.

The Grassland Utilisation Committee's report can have only indirect effect for no one particular action is recommended as likely to speed up our still too slow development of grassland. Attention, however, has been drawn to the inadequate use of fertilisers, and to the



insufficiency of data showing how much farm fertiliser is used upon grass and how much is separately used on cropland. Broadly, all that the report urges must, if it leads to more action, increase fertiliser use on grass. Fearing that too little potash may eventually be used on grass, a minor recommendation was the introduction of a subsidy for potash use in line with those given for nitrogen and phosphate use; but as already observed above, the steady growth of potash use without subsidy encouragement hardly suggests an immediate need for this introduction.

During the year we have had more information than ever before on crop-by-crop rates of use. A sufficient number of district farm surveys for fertiliser practice (England and Wales) is now being carried out for this total 'sample' to be fairly safely regarded as a national sample. Surveys in 1957 were the joint work of the N.A.A.S. and Rothamsted with some assistance from the fertiliser industry's staff. A report in two parts has been issued. It shows very clearly that new or increased grassland use does not account for the major part of expanded fertiliser use in the 1950s. There has been practically no increase in rates of nitrogen given to permanent grass, but some increase in rates given to temporary grass. A Bristol University survey of grassland (V. H. Beynon, 1958) has shown similar trends, though limited, for fertiliser practice sampling to dairy farms in the South-West co-operating in costing record schemes.

Different Measures

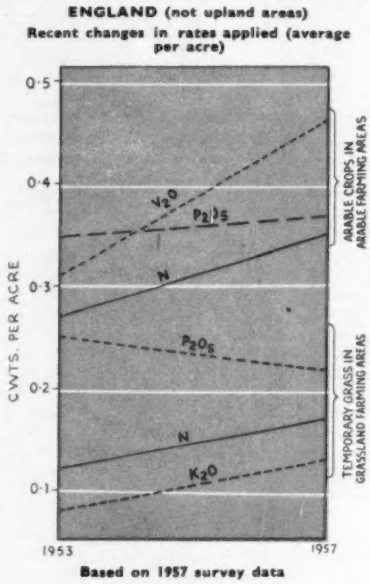
The different measures of the grassland/fertiliser situation shown below are in fair enough agreement, and the following conclusions have broadly been drawn (*Fertiliser Journal*, 1958, **49**, 309-314):

(1) At least 6 out of 10 acres of grassland receive no nitrogen per annum;
(2) at least 7 out of 10 acres receive no phosphate;
(3) at least 8 out of 10 acres receive no potash;
(4) at least 5 out of 10 acres of conserved (hay or silage) grassland receive no nitrogen or phosphate;
(5) at least 7 out of 10 acres of conserved grassland receive no potash.

It is assessment of non-use that shows how much potential opportunity still remains for increased fertiliser consumption; nor are the rates actually given to the fertilised grassland acreage intensive, the average rates being estimated at:

	N	P_2O_5	K_2O
	(lb. per acre)		
Bristol survey	50	56	49
National survey	40	69	48

The national survey, particularly in its second part, gives much information about rates of use on each arable crop, classified roughly according to region and type of farming carried on in the region. One conclusion drawn—that there can be little scope for further increases in cereal yields through increased fertiliser dressings in the arable East and South—is in some conflict with optimum rates for cereals recommended by Bullen and Lessells from a survey of all 1945-55 test data (see last year's review, CHEMICAL AGE, 1958, **79**, 94-96). The average rates given by farmers as shown by the new national survey are still appreciably



below these optimum rates. One can reasonably wonder, also, how these rates compare with rates used in Dutch farming!

Scotland, too, has started district surveys of fertiliser practice, 13 for 1957 or 1958 now having been published; but these are too few, and as yet covering too short a period, to be looked upon as a true national sample of Scottish fertiliser use. So far it is clear that fertiliser use in most Scottish districts exceeds both rate and frequency of use in England and Wales; and grassland is better treated.

The latest FAO survey of world agriculture has analysed fertiliser use from 1952/53 to 1956/57, and although consumption has risen generally, the rate of increase has remained greatest in Europe, and, a little surprisingly, the smallest proportional rises are shown for North America. World consumption of N, P_2O_5, and K_2O has shifted in ratio from 1 : 1.25 : 1 to 1 : 1.1 : 0.9, a considerable change in so short a period. As in the U.K., this is due to small changes in phosphate use at a time when nitrogen and potash uses are steadily advancing.

Proportion of grassland receiving no

	N	P_2O_5	K_2O	
Grazed grass	63	67	82	data from Bristol survey
Hay or silage grass	39	56	65	
All grass	52	63	75	
All grass	69	70	80	data from national survey
Grazed grass	77	77	87	data for one S-W. district in national survey
Hay or silage grass	54	54	70	
All grass	73	71	81	

New compound fertilisers are, of course, always being produced year by year; changes in nutrient content, usually upwards, are modifications of improvement rather than advances entitled to be called 'new'. But for 1958 mention should be made of one entirely new compound or two-nutrient fertiliser, I.C.I.'s Kay-Nitro, containing 16% of both N and K_2O but no phosphate. A granular compound fertiliser without phosphate is new, and there may be considerable spring demand for it on grassland that is phosphate-dressed in the autumn, e.g., by basic slag, or on arable land that has adequate residual phosphate from previous fertilising. In time the availability of such a fertiliser may still further move the U.K. use-ratio towards 1 : 1 : 1.

T.V.A. Research Studies

1958 can be regarded as a 'quiet' year for published developments in the manufacturing field. Two T.V.A. research studies deserve mention. The 76% P_2O_5 'superphosphoric acid' mentioned here in last year's review has been much more fully described, with process-flow details (M. M. Striplin *et al.*, *J. Agric. and Food Chem.*, 1958, **6**, 298). The liquid is less corrosive to metals than phosphoric acid, but is more viscous; however, it is fluid at room temperatures. It is claimed that production costs on a pro rata P_2O_5 content are not significantly greater than for normal strength phosphoric acid.

The other T.V.A. paper has reported a continuous, single-stage process for making triple superphosphate (A. B. Phillips *et al.*, *J. Agric. and Food Chem.*, 1958, **6**, 584). Acidulation and granulation take place simultaneously in a rotary vessel, phosphoric acid and steam being separately underfed into the rolling mass of material. A dry, non-caking product is obtained.

A useful British contribution to the industry's technology has been a review of methods for reducing the gaseous effluent problem on granulation plants, with particular reference to the 1956 Clean Air Act's requirements (F. J. Harris, *Fertiliser Society Proc.*, 1958, No. 49).

Although urea-formaldehyde fertilisers are in greater use and discussion in the U.S., a British paper has thoroughly reviewed progress with these, and given details of research work here on preparation conditions that influence the proportional contents of slowly available nitrogen. The effect of soil pH on release of nitrogen is also discussed; urea-formaldehyde fertilisers would appear to differ from organic nitrogenous fertilisers in this respect (G. W. Winsor and M. I. E. Long, *J. Sci. Food and Agric.*, 1958, **9**, 185). Urea *per se* as a fertiliser has occasionally had toxic effects because of the presence of biuret as an impurity. Conditions inducing biuret formation have been studied; presence of air is a favourable factor, presence of small amounts of water unfavourable; biuret formation is reduced by more than half if urea is held at warm temperatures in an atmosphere of ammonia instead of air (*Ind. and Engng. Chem.*, 1958, **50**, 633).

ANNUAL REVIEW & 1959 PREVIEW

PROGRESS IN PLASTICS

WHEN the history of British plastics comes to be written, it is probable that 1958, or the period reasonably disposed around that date, will be viewed among the significant landmarks in the industry. This is not so much because the past year has been marked by any particular trading boom, since in many ways and in some sections of the industry in particular, the year has been a very difficult one, but because almost for the first time in Britain the psychological as much as the technological portents have been and are favourable. This may be the more clearly seen by brief reference to the growth of the plastics industries in this country.

Plastics as a collective family of man-made materials of construction owed their origin to Baekeland's revolutionary thinking, and to his break-away from classical organic chemistry to use the in-between-products of chemical reaction. They took a firm step forward when Carothers showed in his nylon synthesis that these products can be built up to reasonable predetermined pattern to give products of desired properties.

The intensive researches of the war and post-war years established plastics as "materials of construction in their own right," as has so oft been stated, but in spite of outward enthusiasm and much lip-service of their virtues and potentialities, in this country at any rate, there was always the tendency among the more traditional industries to accept plastics only when this appeared inevitable. There have, of course, been notable exceptions, such as the electrical industry.

The result has been that in many user fields, Britain has trailed behind and has frequently turned to plastics only after these have been proved satisfactory in a particular application in America or Germany. There has been indication for some years that what is currently referred to as the "climate of opinion" in British industry is changing, but at no time has this been so clear as in the past year. No longer do we find manufacturers of plastics preaching to an industry unwilling to be converted to the use of the new products, quite the contrary. Today much of the enthusiasm for plastics is coming from the user industries, and many plastics manufacturers, both of basic materials and finished plastics units, have to adopt a mildly restraining approach to this new found enthusiasm.

Evidence of this has been given at many meetings of learned institutions during the past year. The Conference of Naval Architects and Constructors organised by the Institute of Naval Architects in the spring, revealed what may be described almost as an ardent desire to use plastics in all departments of naval construction, a desire which it appeared had been inadequately met by the plastics industry.

Evidence from the motor-car industry indicates that instead of the relatively few pounds of plastics materials used per car, these might expectably be several hundreds of pounds if plastics could be allowed to function on performance and cost merit basis. Such a change as this could account for an increased demand for plastics equal to at least half the current production in Britain.

The constructional industries are turning more and more to plastics, and although Britain is still lagging behind America and Europe (as the exhibition in Brussels this summer proved) significant forward steps have been made. In large-scale construction, such as the building of public works from motor roads and aerodromes to dams and bridges, plastics are being used, either as primary or secondary constructional materials, and there are indications that the fringe only has been touched.

Agriculture, though not an industry in the general sense, is nevertheless a vital factor in the well-being of mankind, is finding that plastics have much to offer to improve production, both qualitatively and quantitatively.

In all these the recent break-through has been due as much to psychological as to technological influences, and this is something which cannot be stressed too much in reviewing progress in a British industry. There is a certain inevitability in technological advance, but the equally necessary psychological advances depend on that most unpredictable of all factors, public opinion. That in Britain we now appear to have reached the stage when potential users are thinking of reasons why they should or must use plastics instead of reasons why they should not, is indeed an advance of no mean order, and one which, given reasonable luck, must put the progress barometer at 'set fair' for some years to come.

Important and marked as this change has been, it is a local change as far as the British market is concerned, but it can nevertheless be said to reflect world changes outside what may be regarded as the plastics strongholds of America, Britain and Europe. Reports from the U.S.S.R. indicate that the policy of plastics expansion outlined by Mr. Khruschev during the year is under way, and that while both quantitatively and qualitatively Russia may be behind the Western nations, she is certainly making rapid strides. Japan, too, is making considerable progress, but it must be remembered that as with Western Germany, Japan had a significant polymer industry before the war, so that the past decade has been rather the re-establishment of an old industry rather than the expansion of a new one.

This increase in plastics production in the Far East, coupled with the increasing interest in plastics of the Commonwealth countries must inevitably point to less secure exports for Britain in the not too distant future.

It has frequently been a cause for some surprise that in spite of the increase in plastics production in the major countries, their exports have not only been maintained but increased. There must come a time, as was envisaged by evidence given in the recent Board of Trade inquiry (to which reference will be made later), that countries such as Japan have already a considerable exportable surplus of certain plastics (in the case pf p.v.c. this was assessed at of the order of 100,000 tons per annum) which might actually be brought into the British market unless some form of protective tariff can be imposed. While such a state of affairs would favour the plastics fabricators in Britain, the producers of the polymers, which form a significant part of the overall chemical industry, would be hit seriously.

Quite apart from user psychology and overall trade balance, the year has been an

By V. E. Yarsley, M.Sc., D.Sc.(Tech.), M.I.Chem.E. F.R.I.C.

In this article Dr. Yarsley, one of the world's leading polymer chemists and an acknowledged authority on the plastics industry, reviews developments and pinpoints some of the new polymers that are likely to be further developed in 1959. He believes 1958 marked the reaching of the stage when potential users of plastics were thinking of reasons why they should use plastics and not why they should continue with traditional materials.

interesting one and in most cases a remunerative one for the British plastics industry. While board-room forecasts may be currently more cautious than of recent years, few balance sheets among the major companies engaged in the production or application of plastics have been really disappointing, even though percentage-wise the profits may have shown a decrease. Some idea of the commercial trends can be obtained from the *Financial Times* share quotation index which is based on six companies, which with end-of-1949 at 100, showed maximum values at 152.0 on 15 October and minimum of 111.5 on 19 March: this compares with an all-time 'high' of 172.0 on 18 July, 1951, and a low of 87.5 on 12 November, 1952.

Major trends in plastics in Britain continue to reflect world pattern, with increases in thermoplastics outstripping those in thermosetting materials. Major emphasis here is on the three 'polys,' polystyrene, polyvinyl chloride and polythene, the latter continuing to be the most spectacular. Total British production of plastics will have broken another 100,000-ton mark this year, and although the percentage increase may prove to be lower than in recent years, it is regarded as satisfactory in view of the overall world position.

2 Million Tons in 1983

Looking forward 25 years to 1983 at the recent silver jubilee meeting of the British Plastics Federation, Mr. H. A. Collinson forecast a production then of over 2,000,000 tons, a brave total, but not out of keeping with forecasts made elsewhere for our nearest trade rivals, the U.S., W. Germany, Italy, France and Japan. Even if but a modest percentage is actually attained of the production forecast in the major producing countries, it is clear that within the next decade the production of plastics will rival that of many of the traditional materials on a volume if not on a weight basis. Few, if any, of the traditional plastics are fading out and pioneers, such as celluloid and casein appear to hold existing early markets, even if they fail to find new ones. At the end of the year I.C.I. announced that they would cease to manufacture phenolic moulding powders, but this change may be taken as one rather of commercial convenience for the company concerned than as an indication that phenolic plastics are in any serious decline.

A number of new plastics have either been announced during the year or have come to the active pilot stage. These include polyformaldehyde, which is being produced by du Pont in America under the name of Delrin and appears to have many attractive properties, some of them quite surprising in view of the chemical composition of the polymer. Further interesting news has been published of the polycarbonates from Bayer in Germany and G.E.C. in America. Again the limited quantities available for trial give indication of materials of quite remarkable performance at reasonable price.

Most spectacular of all on the raw plastics side has been the progress reported in the production of polypropylene. This indeed has been a word to conjure with since Professor Natta showed that propylene could be polymerised to give an isotactic polymer by the use of his stereospecific catalysts. This was good news, in view of the favourable raw material position which propylene offers, and the fact that it has hitherto resisted all attempts to polymerise by normal methods beyond a grease-like stage. The advent of isotactic polypropylene has certainly 'brought new tactics into thermoplastics' as one wag in the industry picturesquely expressed it.

After vain months of search for trial quantities of the new polymer, interest in British industry was increased when the Shell Chemical Company announced on 1 November 1958, that as a result of continuing research in the polyolefin field, they are now able to offer limited quantities of polypropylene to the plastics industry in the U.K. This material under the name of Carlona is intended for evaluation in the injection moulding field, where its higher softening point, rigidity and tensile strength should open up many new applications for moulded articles. Moulded units so far available have certainly justified these claims, and, together with a remarkable surface finish, should ensure a bright future for polypropylene.

The debut of this material has for the time at any rate taken the spot-light off rigid polythene (polyethylene). The nomenclature battle continues in this country, with current opinion favouring the traditional polythene: outside Britain manufacturers and users alike appear content to settle for polyethylene.

Free Radicals

During the past year the chemist (and the engineer for that matter) has had to absorb many new terms into his technological vocabulary. Isotactic, syndyotactic and atactic are now commonplace, and having assimilated these, he has gone to what amounts to a new realisation of the significance of free radicals. In plastics, as indeed in other fields of modern endeavour, free radical chemistry is taking on a new importance. This and the availability of new and quite remarkable and specifically applicable sources of energy, has brought to the front what is almost a new polymer cult, the grafting of a modern monomer on to the stock of a conventional polymer, such as cellulose or rubber, and the production therefrom of a graft polymer of superior properties. This development is most significant in an age which appears to be so synthesis conscious as almost to have forgotten the most perfect and economical of all polymer chains, that provided by nature in cellulose.

The year has been notable for the number of major gatherings directly associated with the theory and practice of polymer production, many of them in this country. In February a joint one-day conference organised by the Plastics Institute and the Institution of the Rubber Industry, showed quite clearly what joint effort can achieve, and served to unite these two bodies more closely. In April came the symposium devoted to the Physical Properties of Polymers, which was organised to celebrate the silver jubilee of the formation of the Plastics Group of the Society of Chemical Industry, which attracted a large and international audience.

July saw the High Polymer Conference in Nottingham, which again brought polymer chemists to Britain from all over the world. In September, the silver jubilee of the British Plastics Federation was celebrated by a conference at Torquay, and this was followed in rapid succession in October by a technical conference devoted to reinforced plastics, which was also ably organised by the federation. Plastics were also much in evidence throughout the summer at the Brussels exhibition, in Sweden at the biennial Stockholm 'Plastteknik' Conference in October, and the American Society of the Plastics Industry's National Exposition held in Chicago at the end of November. Of interest is the report that Montecatini exhibited here a wide range of polypropylene plastics products, synthetic fibres and textiles.

Also in the Montecatini range and for the first time on exhibition in U.S. were copolymers of ethylene and propylene in the form of truck tyres which had been subjected to exacting road trials in Italy, and may point to this material as a serious competitor for what may be described as 'traditional' synthetic rubber.

For plastics in Britain, a very exciting year of technological development and sound commercial progress ended ironically enough in what was the virtual chemical disinheritance of four major plastics by a tribunal established to consider the claim of the four large British manufacturers of plastics that polythene, polystyrene, polyvinyl chloride and polymethyl methacrylate had been unfairly excluded from Key Industry Duty.

Surprise K.I.D. Ruling

After a long and in many ways very surprising hearing, the verdict was in favour of the Board of Trade ruling that these polymers should carry only the 10% import duty, and putting them outside the class of synthetic organic chemicals. That they are not synthetic organic chemicals within the meaning of the Act as framed can be conceded, since at the time few polymers were known and those which existed were not recognised as such. Even accepting such a circumstance as reasonable and logical, it is difficult to understand how styrene, which is clearly a chemical substance, can become unacceptable as a synthetic organic chemical by the simple process of remaining perfectly undisturbed for a protracted period, sufficient indeed to attain the 'meta' solid state which was referred to in Watts' Chemical Dictionary in 1897.

The verdict of the tribunal has provided much food for thought and opportunity for discussion, but while offering relief to users of the polymers affected, it has severely hit the manufacturers. The position as far as these materials are concerned is that imports into U.K. are covered by a duty of 10% which compares with an import tariff of 25-35% in the U.S., 22 to 27% in Italy, 30% in France, 20% in Japan and 11 to 14% in Germany. There is no appeal against the verdict of the tribunal, but it would appear that something will have to be done alternatively to alleviate what has been described as 'a bitter blow' for U.K. plastics manufacturers.

Public Relations for a Chemical Company

By

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Before meeting his brief for this article on the "the setting up of a Press and Public Relations office for a chemical company", Mr. Galvin Wright considers what is meant by "public relations". He is chairman of the Publicity Committee, Association of British Chemical Manufacturers.

THERE is a good deal of confused thinking about this subject of "public relations". Unfortunately, these two words are being adopted by many organisations and individuals as a descriptive term for "advertising" and "press hand-outs", presumably because they think it sounds much more important. But the public and the press are not fooled by the change in nomenclature and since 90% of what is termed "public relations" is advertising or press agentry in operation it is not surprising that public relations and public relations officers have not achieved the highest acceptance value by the public or the press. The trouble is that it is difficult to remove the words "public relations" from our everyday business jargon and, if used properly, they do cover the activities they describe.

The development and maintenance of good public relations is a major function of management.

Public relations techniques are widely used in industry today, but not all managements understand them, nor do they appreciate how they, as individuals, can help the public relations effort. Good public relations stem from the policies and acts of management. If these are right, then the use of various media for spreading information about them helps the public towards an appreciation of the good character of the organisation. The actual term "public relations" is too narrow because there are many publics—consumers, stockholders, etc.—and not the least important "public" is that represented by a company's staff and workers.

Contacting the Public

Public relations is the effect produced by the sum total of an organisation's contacts with every section of the public, whether external or internal. In a sense, it is the outward manifestation of the administrative or operating philosophy of an organisation. That makes it a management function, and none is more important.

In practice, public relations envisages the use of Press, films, radio, commercial advertising, public speaking, exhibitions and various other media through which an individual or an organisation can express itself to another individual or individuals.

It is more, however, than selling or maintaining a reputation—it is an attitude of mind towards the public and an appreciation of the probable effect of an organisation's deeds upon the public—in short, public statesmanship. In fact, public relations starts at the policy-making table, i.e., in the boardroom.

Looked at from this point of view, it is doubtful whether the majority of companies making up the chemical industry of this country have need of specialised public relations departments and personnel of their own. These are necessary only when a company is operating in fields which place it in view of the public or of large specialised sections of the public and when it desires to establish its corporate character before these "publics".

What, probably, is important to many of the companies in the chemical industry is the maintenance of good relations with shareholders and employees and with the communities living around their works. But this sort of public relations is best effected through members of the boards of these companies—the chairman in direct touch with shareholders and employees (aided, of course, by his colleagues on the board) and directors and works managers meeting the local councillors, neighbouring industrialists, prominent citizens and so forth. There is no place for a specialised public relations officer in these conditions—in fact, he may do more harm than good. Service in the preparation of printed matter can be provided by the company's advertising manager or its advertising agent and, so far as the local press is concerned, it would be very surprising if one member at least of the company's board was not in regular contact with the editor, at the golf club or in the dining room of 'The George' in the High Street!

Must Need P.R.

I am still away from my brief. Why? Because I would not like to see companies in the chemical industry set about establishing public relations departments unless they were, as individual companies, really in need of them.

The large units in the industry have their public relations departments, but the size and scope of their operations justifies this and, indeed, what companies such as Albright and Wilson, Monsanto and, if I may include my own company, I.C.I., do by way of public relations through paid-for space or, if you will, prestige advertising, helps the industry as a whole.

In my opinion, the best thing for the industry to do is to follow the advice given to it by Sir Miles Thomas in the last annual review issue of CHEMICAL AGE—that "the industry should think about some corporate form of publicity". The Association of British Chemical Manufacturers have been considering this for some months now and it is possible that during the coming year some definite action may be taken, but it is no secret that many of the companies in chemical industry are allergic to publicity and, since they have always managed to get along without it, see no reason why they should pay a levy into a trade association publicity fund.

Other industries—iron and steel, for example—think differently and there can be no doubt about the success of the publicity issued by the British Iron and Steel Federation in getting greater public knowledge and appreciation of this industry. It certainly paved the way and conditioned the market, so to speak, for the publicity campaigns of individual companies in the industry, such as Stewarts and Lloyds.

The European Common Market may be

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a prime reason for British chemical industry to bestir itself and make a serious approach to its problem of selling itself as an industry.

All this needs to be said. Having said it, I will now deal with my brief for the sake of any company in the chemical industry which feels that it has a vital need for a press and public relations department.

Objective. A public relations programme should have a purpose. Without an objective any activity becomes pointless. A chemical company may not be interested in the general public, but in one or many of a number of specialised publics—the members of a particular industry, of the medical profession and so on. It is not the main job of public relations to sell goods or services but to develop goodwill for the company. You should decide upon the public or publics, the goodwill and support of which is important to your company and set down the objective you wish to obtain. Unless you do this in advance there will be wasted time, effort and money, whatever you do.

Programme. Having decided on your objectives, you should plan a public relations programme to ensure that all the parts of the company's public are kept fully informed about the company's policies and activities. These parts may be—employees, stockholders, community citizens, agents, distributors, customers, etc.

It should be noted here that your public relations department should realise that its purpose is two fold—it must not only interpret the company to the public but it must also interpret the public and its reactions to your programme to the company.

Interplay of Talents

Personnel. A successful public relations programme depends upon the interplay of many different talents and skills—executive, writing, research, personal contact, material production of films, printed matter, exhibitions and so on. People possessing these abilities must be recruited according to the size and scope of the programme, set-up in accommodation and given the necessary tools and equipment.

Since policy must start at the board table—the programme should be a responsibility of a member of the board. He should do the general planning and controlling the campaign—his P.R.O. and press officer, his colonel and major, giving effect to his initiative.

The questions of the size of your public relations organisation, the types and quality of the personnel employed, need to be answered by the size and scope of the campaign. The creation of a sound organisation in terms of man power, money and facilities is, of course, only part of an over all planning operation.

If you have a good, experienced, all-round advertising agent you might consult him on the setting up of your organisation. There should always be smooth working with the purely advertising function in aid of sales for, let us not forget, while public relations is concerned with company policies and operations, building up a goodwill and prestige background against which the sales and advertising people can go to work, the generic end is more business.

The Institute of Public Relations may be able to help by putting you in touch with possible candidates for jobs in your organisation.

In a reasonable sized public relations department, the P.R.O. will be the press officer as well—indeed, many of the people who describe themselves as P.R.O.'s are, in fact, press officers.

But, if you are looking for someone to fill the particular job of press officer you should try to find him from the ranks of young men or women who have had actual experience as journalists. It is most essential in good press relations to understand what makes news, to understand editorial requirements. Thereby an industrial press officer finds a welcome among his journalist colleagues. Editors will come to look upon him almost as an addition to their staff. He must seek recognition as someone who is not stealthily seeking free advertising but who is helping to find stories in which there is a definite public interest. If what he sends out has no news appeal and is merely thinly-disguised advertising, it will find its way into the wastepaper basket.

It is important that this principle of press relations is well understood, otherwise your public relations campaign will not succeed.

Where should the job of public relations for a company begin? The answer is at home, within a company. No organisation can expect to have friendly relations with the public if those who work within it are not loyal to it.

The administrative policy of any organisation is the starting point, for it is here that the foundation of goodwill is laid. Any company sincerely intent upon building up good relations with the public must adopt a policy that will promote esprit de corps within the organisation.

One section of a company's employees should be specially considered—the sales representatives. These men are in touch with the outside public—a company's customers, their managements and their employees—day in, day out. They should be given regular talks on the company, its operations and its policies, for they are in the front line and will be among the first to receive criticism of the company, or praise of it.

Properly informed employees, through their associations with others, can create a great amount of goodwill for a company. Conversely, ill-informed personnel can do nothing to arrest ill-will, and are more likely to increase it.

New 'Chemical Age Directory' Has More Than 10,000 Buyers' Guide Entries

THE new 'Chemical Age Directory and Who's Who, 1959' is the only directory of its kind to be published in this country. Superseding the former 'Chemical Age Year Book,' it is a comprehensive guide to British chemical and allied industries as well as to firms that supply those industries with equipment and apparatus.

Many of the features of the former 'Year Book' have been retained, and greatly enlarged; these include the 'Buyers' Guide' and the 'Who's Who.' The directory contains 268 pages of a larger size for easier reading.

The Master Index contains the names, addresses and telephone numbers of nearly 1,000 suppliers of chemicals and allied products, and manufacturers of equipment for the chemical industry. This index contains 450 more names than the index to the 1958 'Year Book.'

In the 'Buyers' Guide' section there are more than 10,600 entries under 3,100 individual headings relating to chemicals, items of plant and equipment, apparatus for analytical and research laboratories, pilot plant equipment, safety and anti-corrosion products. This section is an invaluable guide to the industrial buyer of the chemical industry's products.

Also included in this section is a Trade Marks feature, which gives the names of more than 450 registered trade marks and brand names.

A 72-page editorial section contains the names and addresses of trade associations, learned societies and professional organisations concerned with the chemical industry, chemistry and chemical engineering in the U.K. In each case the name of the principal official is given. A special research section lists the principal headquarters staff and working units of the Department of Scientific Industrial Research. It also includes the names and addresses, with the name of the director, of both the grant-aided and the independent research associations and of agricultural research organisations.

Government departments and state organisations are listed comprehensively in a special section. Senior scientific staff and chemical laboratories are noted where applicable.

The 'Who's Who' section is greatly enlarged compared with the former 'Year Book' and in 55-pages contains biographical details relating to more than 3,000 prominent personalities in the chemical industry, in academic and industrial chemistry and in chemical engineering.

The 'Chemical Age Directory and Who's Who, 1959,' is this week being distributed free to all subscribers to CHEMICAL AGE. Extra copies are available to subscribers and non-subscribers at £3 3s. per copy from the Manager, CHEMICAL AGE, 154 Fleet Street, London E.C.4.

ANNUAL REVIEW & 1959 PREVIEW

TRENDS IN THE TREATMENT OF INDUSTRIAL WASTE WATERS

INDUSTRIAL waste waters are as diverse as the industries that produce them; the only recent trend that can be discerned as applying to them all is towards recognition of communal and individual responsibility for the degradation of so many of our rivers by pollution. Some progress towards a more enlightened attitude can be perceived in an increase in the amount of research that is now being directed to the purification of industrial effluents.

It is appropriate that the nationalised industries, with their relatively great resources, should be active in this field, but the short-sighted belief that effluent purification has no significance on production is still far too widely held. Indeed, some trade associations are known to discourage their member firms from spending large sums of money on effluent improvement.

There are comparatively few industrial waste waters in which unstable organic matter, in one form or another, does not occur; it is only to be expected, therefore, that much interest is now being shown in research into biological methods of purification. During the past few years extensive laboratory and pilot-plant scale work has been undertaken, for example, in investigating the biological oxidation of coke oven and gas works effluents[1]. It is now fairly well established that relatively high concentrations of phenols, thiocyanates and cyanides can be oxidised biologically in activated sludge plants and on percolating filters; the efficiency of either process can be increased by artificially raising the temperature to about 50 to 60°C., but there are serious practical objections to these high temperatures, because the discharge of a heated effluent, however well it may be purified, may raise more problems than the treatment solves.

Investigations into biological oxidation of waste waters from paper mills have largely passed the experimental stage. Activated sludge plant or percolating filters are now operating efficiently at several mills here and abroad, and biological treatment can be expected gradually to displace the rather crude and inefficient methods, mainly dependent on settlement of insoluble solids, that hitherto have been the rule rather than the exception in the industry.

The effluent problems of the cotton manufacturer are analogous to those of the papermaker: the kier liquor from cotton and the black liquor from straw and esparto cookers are alike in being strongly alkaline and containing a high proportion of organic matter that is very resistant to biological oxidation. The Water Pollution Research Board has investigated the relative merits of aerobic oxidation and anaerobic digestion of kier liquor[2]. It has been shown that whereas dilution of the waste with three or four volumes of recirculated effluent is necessary to effect substantial reduction of B.O.D. by percolating filters or activated sludge, approximately an equivalent degree of purification can be brought about by anaerobic digestion of the undiluted liquor. The advantages of anaerobic digestion lie mainly in economy of space.

It would greatly benefit the industries they serve if research associations were to devote more attention to the purification of effluents says the author of this special article,

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Agriculture is perhaps the largest industry in this country, and the revolution that has taken place in methods of farming, and particularly the rapid extension of piped water supplies during the past decade, has raised problems of pollution that were practically unknown a few years ago. Among them may be mentioned drainage from silage and from pea harvesting, and the disposal of relatively large volumes of waste water from the drainage and cleaning of shippons and cow houses. The seasonal nature of silage making and pea harvesting preclude the use of percolating filters or activated sludge treatment and, up to now, land irrigation of the wastes seems to be the most effective method of treatment; unfortunately land irrigation is not always practicable, and grossly polluting effluents continue to enter small streams from farms where these operations are conducted.

Effluents from shippons, cow houses and pig farms are less subject to seasonal variation than silage making, but despite the animal origin of the polluting matter in these wastes, it is less readily stabilised by biological oxidation than ordinary domestic sewage[3]. When local conditions permit, land irrigation is probably the most effective known way of treating farm wastes, but success is dependent upon the availability of suitable soil and the method requires more attention than the average farmer is prepared to give. Thus, the problems of disposal are becoming increasingly menacing and should be investigated nationally as a matter of urgency and importance.

Although a study of the literature suggests that more attention is being given to biological treatment of organic trade wastes than to any other system, and it is being applied on an ever widening scale, even a brief review of a present day trends would be incomplete without some mention of the comparatively new Zimmermann process[4,5,6]. This consists essentially in wet combustion of waste water, under pressure, at a temperature of about 280 to 300°C., air being injected to oxidise organic matter. The process was originally developed for the treatment of waste sulphite-cellulose liquor and the recovery of chemicals for re-use. It is now being operated, apparently with success, in Norway, and the U.S. It may be that the principle of wet combustion could be extended to include a wider range of industrial organic wastes, since the high-pressure steam and gases can be used to supply some of the power that is needed and the process has the advantage of not requiring as much land as any method of biological oxidation.

Harmful Wastes

The foregoing brief survey has dealt mainly with trends towards reducing the B.O.D. of industrial waste waters, rather than with the elimination of specifically toxic components. Many effluents, however, are intrinsically poisonous and the concentration of harmful substances in them may be so high as to render the water unacceptable in a stream or river, or even in a public sewer. Among harmful wastes, effluents from electroplating and metal pickling and discharges containing radioactive isotopes may briefly be mentioned. The modern trend in the treatment of plating wastes is towards oxidation of cyanides by alkaline chlorination and the recovery of metals by precipitation with lime after reducing chromium to the trivalent state. In America successful use of ion-exchange in the recovery of metals has been reported[7]. The extension of this principle to the treatment of waste water from other metal industries (e.g. copper pickling) seems probable in the future.

In the U.K. the disposal of industrial waste waters containing radioactive isotopes is mainly in the hands of the Atomic Energy Authority and the Ministry of Housing and Local Government. A good deal of information has been published on the

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Market Research in the Chemical Industry

Pressing Need for More Analytical Approach to Industry's Problems

FEW businesses today can afford to rely wholly on customer relationships built up over the years and as more and more new materials are brought into being, superseding or replacing existing ones, there is a strong need to keep a close watch on all new trends and developments and to prepare in advance to meet changes in demand.

A firm sustaining even the mildest recession will automatically try to understand reasons for the decline by investigating where economies can be made and justifiably this might be the root of the problem. But, in the writer's opinion, very often the questions (a) Is demand for the product sufficient? (b) Is the selling price competitive? and (c) Is there efficiency of distribution? cannot be satisfactorily answered unless specialist skill and knowledge are employed.

It might be thought that answers to these questions could be supplied by the managements concerned, but very often this is not the case and their practical solution is best approached through market research.

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Selective Purchasing

In recent times there have been many conflicting views about the function of market research, and while it is commonly believed to be a study of distributive factors and of consumers' preferences, market research also studies more widely the demand for products and also the demand for the component materials and services which their production creates. If the use of the words 'market research' is bad terminology in this sense then it is because no other suitable epithets can be applied to the very valuable function which investigates the process of manufacturing from a different angle to the more normal aspects such as sales, technical, financial, etc. It is often within the scope of market research to suggest new usage patterns for materials, discover means of utilising existing plant to better advantage, etc., or to exist for no other purpose than to compile information and data which the separate sections of the firm can draw upon. Market research can thus become a perceptive function integrated with all parts of the organisation as well as helping the executive.

Separate Units

In embryo, market research is carried out consciously or otherwise by every firm, in one way or another, but within recent years the biggest advances have been made in the chemical industry by those companies and groups of companies in a position to employ separate or autonomous units within their own organisations. These units may be responsible to a commercial director or even to the main board direct, but in actual operation the market research team is often used purely as an adjunct of the sales function.

In other cases the value of 'commodity' or procurement research may assume greater proportions, but views often tend to become flavoured with the outlook of the personnel concerned. Thus the sales 'angle' will place more value upon distribution of existing products or new products to be launched whereas the procurement view will favour seeking alternative sources of supply of commodities on the existing user-range of the company's products or new uses for materials.

In neither of these cases can investigation be called true market research employed to best advantage and rarely does there seem to be evidence of complete liaison between the various departments concerned. Often there is an overlapping of effort and the positive value of any enquiry may be vitiated.

The large issues which major companies and groups may have to consider in any new developments are normally of wider scope than investigations through market research can ordinarily provide, but basically it seems that where there is a change in the pattern of demand (either in progress or contemplated) this will in some way have bearing not only upon the end-products but also upon the constituent materials in demand for their production. Thus the pattern of demand for coal-tar based products and petroleum derivatives has changed over the past 20 years owing to developments in the fields of detergents, plastics, synthetic fibres and rubber-like polymers. The growth of this demand has led to a re-assessment of hitherto superficial or wasted by-products and existing supply sources. In the same manner in which technical research is able to change the demand-pattern so, it is considered, market research can be used as the means of interpreting these complex changes to best advantage.

A great danger lies in thinking that market research is the concern only of the major producer with the financial resources able to carry out extensive enquiries of this nature. Obviously the larger companies and groups are in a position to investigate the problems at national and international levels much better than the smaller firms whose resources are limited but the issues involved are similar at all levels and it is in the best interests of any company to acquire the most up-to-date knowledge available.

In the case of the smaller firm there is perhaps the greatest need for market research of some kind usually where financial resources can least be hypothecated for this purpose. If investigations are carried out at all they will more than probably be done in conjunction with other work or even by one of the executive staff. In a few cases it is often assumed that research is bound to cost money and market research, being erroneously considered of least importance and unlikely to produce results, is sometimes not contemplated at all.

With the increasing tendency for the big companies to become large-scale producers of solvents, detergents, plastics raw materials, coal-tar based products and so on, the need today is for a greater degree of specialisation among smaller firms in certain fields. This means that a very much closer study of all aspects of the product will have to be made since the producer, by specialising, narrows the extent of his market and must, therefore, obtain maximum efficiency from his production unit. Cases are known of firms applying the best possible technical knowledge to plant design, lay-out and processing, but often the more commercial side of the business is 'left to take care of itself'.

Specialisation

The form which Market Research might conveniently be considered will depend on the nature of the enquiries to be made and the results being sought. In general terms, a firm considering new developments or extensions of sales will require information and the investigator's job will be to appraise that firm's existing lines and projected new ones in relation to the demand pattern as a whole. This type of market research can, therefore, be divided into 'specific research' and 'potential research'.

Specific Research:

(a) Similar or alternative products already available or about to be launched which might influence customers' preferences.
(b) Information about these products, mode of manufacture, composition, supply, price, whether covered by patents, etc.
(c) Changes in customers own production lines and methods of manufacture which might have bearing on the demand for the firm's products

(in the case of products for the retail consumer markets, changes in usage pattern will be studied).

(d) New methods of presentation, advertising, technical advice and assistance compared with the firm's own methods.

(e) Changes, economic or otherwise, likely to effect demand for the firm's products and also demand for the component materials used in their production.

Potential Research:

(a) Finding new and expanding markets for lines of production already introduced by the firm particularly in fields outside the normal customer range of the sales department.

(b) Finding potential customers for a product or products which the firm has been asked to make by one or more customers and for which it has excess production capacity.

(c) Searching for users of those chemicals which could be manufactured on existing plant either by utilising current stocks of production materials and/or by-products generated during processing or making analogous products (e.g. alkyl homologues, etc.).

(d) Using existing plant (or redundant plant) to manufacture 'tailor-made' chemicals to customer's specification.

The above is a bare outline of some of the scope afforded to an investigator sufficiently adaptable to understand the needs of a firm in broad aspects. The writer's own organisation has been called in to operate for a number of firms along these lines in various ways and some very successful results have been achieved. On a short-term consultancy basis market research can often be carried out by one individual at a relatively nominal cost.

Investigator's Fault

Where market research fails it is usually due to the inability of the investigator to obtain precise and accurate information.

The difficulties of obtaining information and facts seem to be inversely proportional to the size of the firm and the smaller the company the less likely are individuals able to devote time to collecting and appraising data. In any new developments there is an element of secrecy involved which makes it impossible for anyone outside the immediate organisations concerned to get hold of facts. Often information has to be obtained from sources which are not primarily connected with the chemical industry, thus Government records are formally statistical and if too much reliance is placed on them there is a tendency to oversimplify possible trends or changes. Government records are also often inadequate owing to the method used for grouping and sectionalising information and not being up to date.

Undoubtedly the best and only sure method of acquiring information is by personal approach. The system often used in market research for 'sampling' retail consumers' views by the 'door-to-door' and questionnaire method, cannot obviously be applied by the investigator dealing with firms in the chemical industry, but the principles are very much the same. What the enquirer seeks is specific information and often personal contact combined with a flair for honest, friendly negotiation can elucidate more facts than any other method of enquiry.

So far the approach to market research has been taken from the standpoint of those manufacturing firms engaged, or closely allied to, the British chemical industry. There are an increasing number of firms largely or entirely controlled by American and Continental companies whose policies are formulated by the parent organisation leaving little that can be done 'parochially' in Great Britain. In such cases any market research becomes primarily a matter of seeking specific information and there exist a number of specialist consultants and others who act semi-professionally without drawing conclusions as to principles involved.

Other private organisations exist to carry out full-scale programmes of market research or act as intermediaries for the purpose of expanding the market for various products and even combining this with the actual procurement of commodities and raw materials on behalf of principals.

This attempt to illustrate the possible value and meaning of market research might give the impression that some confusion exists, in the writer's mind, in the distinctions to be drawn between marketing and market research as such. However, it seems that no hard and fast dividing line can be drawn between marketing in operation and the study of its principles. Market research is not an exact 'science' nor does it in any way propound theories which might be applied to each and every firm. So far as it concerns the chemical industry it can afford the best means of helping towards solving problems which confront manufacturers and others alike from time to time. If its detractors insist that any properly organised firm will automatically study those problems which market research presumes to segregate from the whole, then at least some thought will have been given to what there is a pressing need for in the U.K. chemical industry at the present time: simply a more analytical approach to the problems which prosperity invokes in terms of material resources.

Treatment of Industrial Waste Waters

(*Continued from p.* 85)

effect of coagulation and filtration of radioactive wastes, but at the present time the only methods of disposal that are extensively used are the concentration and long storage of high activity wastes, and controlled discharge into deep sea water of wastes of low activity. It is clear that only a nationally-subsidised industry could contemplate such expensive methods of disposal.

Sections of the chemical industry have to dispose annually of vast quantities of semi-solid waste in the form of sludge or slurry. Unfortunately no 'trend' in dealing with this problem can be discerned. The slurry is usually dumped on any available land, in uninhibited disregard for the ultimate troubles of our sons and grandsons. Local authorities now seeking to develop land that was abandoned to chemical waste disposal some 60 or 70 years ago have rueful knowledge of how great these difficulties are likely to be.

Very large industrial organisations and the National Boards have the resources to undertake research and ultimately to give full treatment to their wastes. It is not always so easy for smaller firms to provide equipment and the necessary trained supervision, even when appropriate methods of treatment are known. Clearly, trade effluents of manageable volume are far more efficiently dealt with in combination with domestic sewage at properly equipped works, but in the past opposition from some of the smaller sewerage authorities has restricted the intended benefits of the Public Health (Drainage of Trade Premises Act) of 1937. Since the River Boards Act of 1949 and the Rivers (Prevention of Pollution) Act, 1951, came into operation, there has been a welcome trend, actively encouraged by the River Boards, towards the amalgamation of smaller sewage authorities into joint sewerage boards, which have greater resources for dealing with trade waste. Financial restrictions have made progress in this direction slow, but there is no doubt that reorganisation of sewage disposal will offer greater opportunities for collective treatment of trade wastes and it should be encouraged by industry.

Water is a principal raw material for a majority of the manufacturing industries of this country, and it is becoming increasingly apparent that water shortage will inevitably restrict the normal expansion and development of industry in the near future unless many more second-class supplies can be made available from rivers and streams.

At present, pollution is rendering the lower reaches of rivers in the large industrial districts useless for any other purpose than cooling. It is in the interests of British industry itself, therefore, as well as in the overall national interest, that the problem of river pollution should be tackled with the vigour that is now accorded to developing and improving methods of production.

It cannot be too strongly emphasised that reasonably clean water is essential for production and, on a long-term view, the various research associations would confer great benefits to the sectional interests which support them if they devoted far more attention than they now do to the purification of industrial wastes. Many authorities believe that the red light is showing, and the time is short.

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THE point that no company of British origin had yet been main contractors for the design of an oil refinery was made by Mr. J. Maurice Laing, managing director of John Laing and Sons at the recent Dollar Exports Council Conference held at Eastbourne. Speaking about prospects for turnkey projects in the dollar area, Mr. Laing said that participation of British companies in the design of chemical plants was also capable of considerable expansion.

He made the valid point that as long as they lacked design experience, British interests would suffer a considerable handicap in their efforts to sell their goods in underdeveloped countries as they were unable to point to projects for which they had been responsible through all stages from conception to completion. He added that had the design of some of the recent projects been in British hands, the volume of British orders would have been much greater.

Certainly in recent years, the British chemical plant industry has grown immeasurably in stature, but it still tends to be overshadowed by the many U.S. controlled concerns in this country. I cannot help feeling that having profited greatly from large contracts recently handled, the U.K. companies will from 1959 onwards be taking on even more responsible work.

I LEARN from Farbenfabriken Bayer that they expect price cuts on chemicals 'from all sides' during 1959, in view of the increased capacities of the major chemical producing countries. Bayer directors also think that U.S. competition will necessitate the investment of large sums on expansion programmes on the part of European producers. In addition, exports to many of the underdeveloped countries are expected to become less easy.

Against this background, however, Bayer stress that the chemical industry as a whole has done far better than expected in the latter part of 1958. On the Continent it will be given extra stimulus in 1959 by the Common Market agreement.

Bayer hold my view that so far as chemicals are concerned the C.M. will not be successful until a free trade area is set up comprising the O.E.E.C.-member nations.

THE first Australian exhibition of automatic analytical instruments is to be held in the Sydney showrooms of Watson Victor Ltd. during the fortnight beginning 23 February. The instruments, having a total value of about £35,000, will be representative of those made by Hilger and Watts Ltd., and it is indicative of the faith this firm has in the Australian market (and in the willingness of the Australian manufacturer to accept new methods) that they are prepared to make so heavy an outlay for exhibition purposes. Their sales director, Mr. D. R. Stanley, will be at the exhibition together with technical specialists from the U.K.

Industrialists and scientists will be invited to the exhibition from all over Australia and will be able to see the instruments in full working order. Samples of steel and non-ferrous alloys will be tested and analysed and the results presented in no more than a few minutes.

The advantages of instruments, able so quickly to complete analyses that might well take a chemist several hours, should need no stressing to go-ahead Australian businessmen, particularly as the instruments can be used to analyse not only metals but powders, glasses, oils, ores, clays, and soils.

SEVERAL requests have been received by the Patents Office for the Calico Printers' Association's case for the extension of its Terylene patents to be in public. Two patents are involved—the main patent, No. 578,089, covering the manufacture of highly polymeric substances, and the patent of addition, No. 603,827, covering the making of artificial fibres from those substances.

I learn that the requests are still being considered. Cases at the Patents Office have been heard in private, at least for many years past. I understand that the office is now studying the position to determine whether it is within its province to allow the public to attend.

'PROSPECTS,' published by Acheson Colloids Ltd., whose head office is now P.O. Box 12, Prince Rock, Plymouth, for users of 'dag' dispersions describes the main uses for 'dag' colloidal graphite in nuclear engineering. At Windscale, for instance, colloidal graphite has proved an effective barrier material, which, in addition to providing lubrication, prevents chemical reaction between incompatible metals. At Calder Hall 'dag 459,' a coating composition, was used to protect the interior surfaces of the pile chamber and cooling ducting; it has to stand up to temperatures of 400° in a CO_2 atmosphere.

Nearly 3 cwt. of the same product are needed to treat 8,000 sq. ft. surface area of each of the 12 200-ton heat exchangers for the Bradwell Nuclear Power Station. Because they will be handling contaminated CO_2, the need for internal surface cleanliness led to the shotblasting of the interiors and brushing with 'dag' 459. The thermal sleeves are smeared with Gredag graphited grease, YK, as an anti-seizure measure.

From the same issue of *Prospects* (No. 5), I was also interested to learn that a 7-ton Commer truck of Harry Hardy Ltd., chemical producers, Leeds, had just completed 365,000 miles after having 'Oildag' (colloidal graphite in oil) in the engine, gearbox and rear axle since its first day on the road. On servicing it was seen that the bores and crank bearings showed only .002 in. wear, less than half the average wear after that mileage.

A NEW type of organisation for Anglo-German trade, pioneered by Ashe Laboratories Ltd., Leatherhead, centres on an Ashe subsidiary, Ashe Laboratories G.m.b.H., with headquarters at Arnoldstr. 7, Dusseldorf. From here a special sales force of 30 representatives will establish direct contact with German outlets for the Ashe range of products.

The German sales team made a flying visit to the U.K. this week to inaugurate the scheme. Established after two years' German market research and months of negotiation, it is anticipated that the representatives will at a later date carry the products of other U.K. manufacturers. English director of the new company is Mr. K. H. W. Young, export director of Ashe; the German director is Mr. G. Neugebauer.

EVANS MEDICAL SUPPLIES inform me that they have now completed the transfer to their Speke works of all the manufacturing activities previously carried on at the Evans Pharmaceutical Laboratories, Fleet Street, Liverpool. Laboratories and drug mills were first established in Fleet Street in 1846, although it is believed that the company was engaged in the manufacture of pharmaceutical preparations in London at a much earlier date.

I recall that several well-known figures in the pharmaceutical industry have been associated with the Fleet Street laboratories, including Henry Sugden Evans, a son of John Evans, who founded the company in 1809, and Michael Conroy, who directed manufacture from 1879 to 1894. Henry Sugden Evans later became the first government analyst to the Dominion of Canada.

The Fleet Street laboratories survived the intensive air raids on Liverpool in 1940 and 1941, although the company's premises in adjacent Hanover Street and Seel Street were completely destroyed. The Fleet Street laboratories, which served the company for 113 years, have now been closed and Evans Medical enter their 150th year with all manufacturing activities on Merseyside concentrated in the Speke works and in the Evans Biological Institute and Evans Fine Chemical Works, Runcorn.

Alembic

ACHIEVEMENTS AND TRENDS IN SCIENTIFIC INSTRUMENTS

Trade Expands Despite Competition

By
R. Barrington Brock,
President
Scientific Instrument
Manufacturers' Association

Mr. Brock is seen here opening the recent S.I.M.A. convention

SINCE the war progress and development in British instruments has been most striking. We are now, in fact, making great headway in selling our instruments even to the countries which before used to be regarded themselves as a source of much of the most advanced instrumentation.

Very many of our members have set up selling organisations all over Europe and are doing extremely good business, and now, of course, we are expanding all over the rest of the world against all competition.

The important thing from the national point of view is that in doing this we are selling goods which are not readily upset by competition from cheap labour countries. We are in fact selling brain power and know-how, and this is one of the things in which Britain can hope to keep ahead even against other nations which may have much cheaper manufacturing facilities.

A fresh aspect of the export drive has been the scientific instrument industry's move to start world wide advertising of British instruments in general. Many people will have seen the first batch of advertisements which started going out in the middle of 1958. In these advertisements we used the theme of 'information to users'. The advertisements were designed to bring the scientists' attention to the new Instrument Inquiry Service which Sima has inaugurated so that users all over the world can write or even 'phone and obtain technical information of the highest standing on all types of British instruments.

This is a great step for any industry to take and it is operating quite irrespective of whether the firms making the instruments are members of our association or not.

Next Major Advance

The next point which I think I should mention is the question of the future trend of the industry. I should emphasise that as far as I can see the next major advance has to be in the industries which are scientifically backward. All over the world we have vast industries which have been going on for a long time by rule of thumb methods and it is going to be the task of the scientific instrument industry to prove to these industries the real cash advantages they can expect by instrumenting in an effective way.

It is not, I think, generally appreciated how enormous this market is. When you think of all the traditional industries in this country and every other country you will find that the majority of them have not really considered scientific apparatus in the way in which the more modern industries have done. The chemical industry of course is a particularly good example of instrumentation, but there are still a large number of allied industries which are virtually working in the Dark Ages. These people in general really have no use for science at the moment and they have got to be convinced that the use of instruments will either make their products cheaper, thereby showing them more profit, or will enable them to produce goods more quickly, or will save wastage. In many cases they do not seem really interested in the production of new lines and therefore the other great aspect of scientific instruments, that is the possibility they open up for producing something quite new which was previously impossible, may not appeal.

But this is where the big future lies. The major users in the chemical industry are already well instrumented and while, as they expand they will of course use more instruments, it is to the older and hitherto backward industries that we can look for immediate improvements.

The actual trends in the instruments themselves probably follow to some extent the pattern I have just given. These backward industries need to begin with relatively simple instrumentation but as they get convinced of the advantages, I think it is probable that they will require more and more complex instruments.

Automation and Computers

The more heavily instrumented industries will, of course, already consider the use of more complex instruments both in the laboratories and on the plant. It is when one gets into complex control that one goes into automation and computer systems. Here I think I should pay tribute to the chemical industry which of course has been using automation in many ways for a very long time without making a song about it. It is no less automation when it has been done in the way that they have developed it than it is when it is done on an electronic computer. But any process which enables a flow system to operate with the minimum of labour can, I think, be classed as automation in one form or another.

Finally, I come to the main theme of 'collaboration between the manufacturer of instruments and the user'. In the past there seems to have been a great gulf between these two. All the manufacturers contact the users individually but this usually leads to more and more confusion because every user tends to give details of what he wants in a different way and it needs some centralised collaboration to try to produce in the modern complex apparatus the best compromise which will do the jobs which are required by a large number of users. Obviously, it is no good producing an instrument as a 'one off'. If one makes one of these complex modern instruments then it must be suitable for a lot of different jobs otherwise the cost is going to be prohibitive.

In order to start on this collaboration, Sima arranged at their recent Harrogate Convention that we would have users present and in the discussion panels the users and the manufacturers were able to argue out points on future trends, servicing, plant instrumentation, laboratory instrumentation, etc. A great deal of useful information was, I think, gathered by both sides and I feel that one of my most useful jobs as president will be to assist the continuation of this type of collaboration.

As an example, one of the most surprising things which we discovered was that many of the biggest users had no real ideas of how to get at all the manufacturers to find out what was available. The Instrument Inquiry Service is obviously of far more value than we thought, but I must emphasise, above all, that no one can know all the ramifications of the industry, and if a user requires an instrument of some complexity, and he does not know if it is available in this country, then he should put this problem direct to the Sima head office. If the Instrument Inquiry Service cannot give an answer on this matter then the secretariat will circularise all the members and it will be very surprising if somebody is not interested in the problem and able to offer a solution. We found to our surprise that many of the biggest users were content to write to two or three likely manufacturers and if none of them were interested they gave the matter up as a bad job or perhaps obtained their requirements from abroad.

In many cases their requirements could have been met if they had found a way to reach the whole industry, and we feel that our new arrangements are likely to assist users to a very great extent.

Letters to the Editor

Polymer Tribunal Typifies 'Crazy' Economic System : Economics of Hydrogen Production

SIR,—The spectacle of some of the country's best scientific brains attempting to define the indefinable is either comic or tragic, depending upon the degree of cynicism of the observer.

What on earth does it matter, from the economic point of view, whether a plastics is a synthetic organic compound or an undefined mixture; surely the only thing that matters is whether it is in the country's interest to tax the import of this particular material or not, and if so, at what level and then the material is defined by its presence on the appropriate list. To define a plastics is just about as easy and as useful as defining a fine chemical which, according to the most intelligent authorities, is any material manufactured of fine chemicals; that is, any material on an agreed list of fine chemicals.

But this present administrators' delight and scientists' nightmare is only what is to be expected from administrators who cannot decide whether the purpose of an economic system is to provide a high standard of living and lots of leisure for the people (which is what I understand by prosperity), or whether it is to provide full employment—these objectives are mutually incompatible in a power age and will be even more so in the coming super-power nuclear age.

If only a small proportion of the brainpower expended at the Polymer Inquiry (CHEMICAL AGE, 15, 22, 29 November, 6 December) were to be devoted to even a cursory examination of monetary and credit policy, the folly and futility of the inquiry and what it typifies—an economic system which is considered by many to be illogical and even crazy—we might get somewhere.

It appears, however, that scientists in general accept without question the superstitions upon which the economic and monetary system are based, gold 'standards', monetary control of production instead of the obviously sane opposite, etc., and while this is so, scientists will always play second fiddle to administrative politics.

Yours, etc.,
M. A. PHILLIPS.

9 Western Road,
Romford,
Essex.

Producing Hydrogen for Fuel Cells

SIR,—I have read with great interest your account of the development of fuel cells in the U.K. and U.S. (CHEMICAL AGE, 13 December 1958). The development is certainly an interesting one and is undoubtedly of national importance.

I was surprised, however, to understand from your second paragraph that you consider cheap hydrogen to be available by the decomposition of lithium hydride and hydrazine, when you have made no mention of certain other well-known and well-established production methods such as the steam-hydrocarbon reaction and the steam-iron reaction. Both of these processes will produce hydrogen in Britain today at a total cost of about 14s. to 14s. 6d. per 1,000 standard cu. ft. when the processes are based on traditional fuels such as coke, producer gas or propane/butane mixtures. I do not know what the cost of producing hydrogen from coal by steam treatment would be, but I would imagine that, with coal at today's prices in Britain, the total production cost would certainly be in excess of 14s. 6d. a 1,000 cu. ft.

Also, you may know that very large quantities of very cheap fuel are now available and will in the future be available in even larger quantities from the National Coal Board's Mines Drainage programme. This fuel is an ideal starting material from which to prepare hydrogen by the steam-iron process, and my own investigations suggest that 1,000 standard cu. ft. (s.c.f.) of hydrogen prepared from drained methane by an application of the Schultz steam iron process will cost between 7s. and 9s. per 1,000/s.c.f. only. This cost is certainly as low as the present day cost of reformed stock from petroleum refineries which, as you undoubtedly will be aware, contains approximately 75% hydrogen only, whereas pure hydrogen can be manufactured from drained methane at no appreciably higher cost.

I should be pleased to hear whether the methods of producing cheap hydrogen mentioned in paragraph two of your editorial have been operated on the large scale, and if so, will you write down for me what is the actual production cost of hydrogen when made by the mentioned processes.

Yours faithfully,
P. V. CLIFTON,

Sharples Process Engineers Ltd.,
197 Knightsbridge,
London S.W.7.

Changes to Soviet Bloc Embargo List

FURTHER changes have been made in the list of goods embargoed to the Soviet Bloc and China, published in CHEMICAL AGE, 23 August 1958, p. 293. In Group I, chemicals, plastics and synthetic rubbers, entries relating to 'bromine trifluoride' and 'germanium having a resistivity of 50 ohms per centimetre or more' should be deleted.

The entry relating to fluorinated hydrocarbons should be amended to read: 'monochlorodifluoromethane; trichlorotrifluoroethane; dichlorotetrafluoroethane.'

After the entry relating to guanidine nitrate insert: 'hydrazine, hydrazine nitrate.' Entries relating to deuterium and lithium compounds are amended.

Changes have been made in Group B (chemical plant), deleting 'vacuum diffusion pumps' and amending the entries relating to centrifugal counter-current solvent extractors, centrifuges, compressors and blowers, equipment for the separation of isotopes and uranium, and vacuum furnaces.

Other changes are made in the following groups: Group D, amendment to artificial graphite; Group G, deleting balances of a sensitivity of 0.1 microgramme or better, fluorimeters, leak detecting instruments, radiation detection instruments. Changes are made in entries relating to ion separators and positive ion sources; Group H, entry for fissionable materials amended; Group J, amendment to entry for 'Lubricating oils and greases synthetic (ester) type.'

Inquiries about the changes should be sent to the Commercial Relations and Exports Department, Board of Trade, Horse Guards Avenue, London S.W.1.

Intensive 5-day Course in Polarography

TO MEET the demand for an intensive full-time course in polarography arrangements have been made for a five-day training course to be held during the week 12 to 16 January 1959. Object of the course is the provision of basic training in the theory and practice of polarography, and will include lectures, directed reading and practical exercises in direct current, alternating current, cathode-ray and square-wave polarography. Instrumental training will be given on manual, d.c. pen-recording, cathode-ray, phase-selective and square-wave polarographs. Instruction will also be provided in the use of conventional, wide-bore and solid electrode systems.

Instruction in each technique will be provided by specialists from the British Polarographic Research Institute's technical advisory panel; applicants will be expected to have some acquaintance with the principles of polarography.

Calcium DL-pantothenate Exempt Import Duty

Import Duties (Temporary Exemptions) (No. 3) Order, 1958 revokes as from 1 January 1959, exemption from import duty of calcium DL-pantothenate specified under heading 29.38 in the Import Duties (Temporary Exemptions) (No. 1) Order, 1958 (S.I. 1958 No. 2076), which came into operation on 1 January 1959. The order has been published as Statutory Instruments 1958, No. 2225.

COAL TAR TECHNOLOGY, 1958

World-wide Progress Reviewed by Coal Tar Research Association

OF RECENT developments in coal tar technology during the period January to June 1958, reviewed by the Coal Tar Research Association (C.T.R.A.) (*Review of Coal Tar Technology*, January-June 1958, Vol. X, Part I, published by C.T.R.A., Oxford Road, Gomersal, Leeds, price to non-members 10s.), many are due to Russian and Iron Curtain workers. Japanese and German investigators are also noteworthy. Below a few of the many interesting processes, techniques, reactions, etc., reviewed are noted.

Coal Tar Distillation. From the Kharkov Coal Tar Research Institute (*Koks i Khim.*, 1958, No. 3, 34-7) lines for the future development of the Ukrainian tar industry are suggested, which include centralisation of tar distillation, production of phthalic anhydride directly from naphthalene oil at the distilleries, and recovery of carbazole and acenaphthene for use in resins. The operation of a flash vaporisation pipestill at the Zaporozhe by products works has been described (*Koks i Khim.*, 1958, No. 3, 57, N. A. Akimova). Use of a short heating time, it is claimed, leads to less condensation and polymerisation, and hence a low pitch yield and two anthracene oil fractions, the second of which is rich in high-boiling constituents.

Success of Aluminium

The Northern Aluminium Co. Ltd. has reported that aluminium has been found to be generally successful as a construction material in tar distillation plants, although distillation products at 170 to 320°C may have some action because of their content of anhydrous phenol.

In research on U.S. primary low temperature tar, the tar has been given a preliminary hydrogenation over a cobalt/molybdenum catalyst before distillation in the normal way to give mainly motor spirit and diesel fuel (Erdöl u. Kohle, 1958 (May), **11**, 326, R. D. Law). A similar hydrogenation process is reported from Germany (German P. 926,664) which claims that iron-containing bauxite, clay or zeolite catalyst are as effective as molybdenum catalysts.

Hydrorefining of Benzole. At the Drocourt plant, France, benzole is refined by precise distillation to give products distilling up to 80°C, benzene, toluene and hydrocarbons distilling between 111 and 180°C, followed by hydrorefining of the benzene and toluene fractions, and fractionation of the high hydrocarbon fraction (*Mines*, 1957, **12**, No. 3, 243, Ployart).

Scholven Chemie (B.P. 789,986) claim that the decrease in useful life and activity of the catalyst observed when coal gas is used in heat treatment of feedstock, can be overcome by initially heat treating the gas and benzene for one hour at such pressures and temperatures that the benzene is liquid. Polymerisation of injurious substances to the catalyst in both gas and benzene is effected, so that these form a residue when the benzene is evaporated. A Badische Anilin-und Soda-Fabrik patent (B.P. 789,988) claims that the presence of carbon monoxide in the hydrogenating gas is advantageous, the specially high refining action being due to the increased catalyst temperature rise of 10 to 50°C caused by the exothermic nature of the reaction between the hydrogen and carbon monoxide.

Desulphurising Benzene

From Poland there is a method for desulphurising crude benzene, toluene and xylenes by refluxing with 0.1% by weight of copper powder. (*Chemik* (*Gliwice*), 1957, **10**, 217). This is reported to reduce the sulphur of a xylene fraction from 0.0288% to 0.0035% with improvement in odour and copper strip test. One charge of copper powder is capable of fifteen desulphurisations; the presence of water is advantageous to the reaction.

Water Permeability of Bitumen. To measure the water permeability of bitumen, samples of aggregate are first heated with an aqueous solution of calcium chloride containing ^{45}Ca. Samples are then dried, coated with the bitumen under test and then immersed in water. The concentration of radioactive calcium subsequently measured in the water is a measure of the permeability of the bitumen to water. Tests showed the value of adding 2% of iron oleate to the bitumen (*Bit., Teere, Asph., Peche*, 1958, **9** (March), 84).

Preparation of Tar Acids. Reichel *et al.* has studied alkali fusion processes for the production of phenol and naphthol from the corresponding sulphonates Phenanthrene has been used successfully as an inert medium for the fusion stage. (*Rev. Chim.* (Bucharest), 1958, **9** (February, 80).

Shell Development Co., U.S., have patented a process (U.S.P. 2,792,430) for the continuous production of phenol which consists in reacting a mixture of benzene and aqueous hydrogen peroxide at 460 to 550°C. Phenol and diphenyl would be produced in yields of 4.3 and 37% respectively, based on the peroxide used, but by introducing free oxygen during the reaction the yields are changed to 36 and 6% respectively. The yield of phenol is increased to 40 to 60% if water is introduced continuously. Similar results, it is stated, are obtained for the conversion of naphthalene to naphthol.

Water Removal From Crude Phenol. A process for the removal of water from crude phenol by azeotropic distillation at atmospheric pressure has been patented (Rütgerswerke A.G., German P. 925,350). The dried phenol is then fractionated under reduced pressure.

Disposal of Phenolic Effluents. Treatment of effluents at the Anacortes refinery of the Shell Oil Co., has been described in detail (*Pet. Refiner*, 1958, **37** (May), 153). Oil removal by means of a separator and flocculators is followed by biological treatment on a trickle filter and in an aeration basin. The development of the activated sludge used in the plant is described; ordinary activated sludge was treated with cresylic acid until a phenol-consuming strain was bred.

Russian work describes how aluminium hydroxide, derived from the catalyst used in an indene/coumarone resin plant, which was adversely affecting the dephenolation of a tar effluent, was removed by neutralisation and filtration. This also reduced the benzene content; a further reduction was effected by settling (*Koks i Khim.*, 1958, No. 3, 40, V. N. Nenich).

Dephenolation Processes

A U.S. dephenolation process consists in adjusting the effluent pH to 6.5 to 9.5 and treating with an approximately equal volume of an aromatic solvent (e.g. toluene) containing 2-methyl 5-ethyl pyridine (U.S.P. 2,812,305).

Now available in the U.K. is the Wilputte (Allied Chemical and Dye Corporation (*Chemical Engng.*, 1958, **65**, 56 (4 April)) process for dephenolating ammoniacal liquor. Phenols are first extracted from the liquor by a light aromatic oil in a Podbielniak centrifugal contactor, and then stripped from the oil with caustic soda in a second centrifuge. A 29% caustic soda solution is used in the initial recovery stage; the residual phenols are recovered with 10% caustic giving a total recovery of 99% as a 35% phenolate solution.

Results of the laboratory scale treatment of ammoniacal waste liquors with ozone have been published (*Gas World*, 1958, **147** (4 January), section *Coking*, **52**, 7). Phenols and other chemicals were destroyed efficiently but undesirable acids and oxygen absorbants were formed. Costs of total treatment would be high. It is suggested that one possible use of ozonisation would be as pre-treatment to remove thiocyanate and thiosulphate before dephenolation. Experimental results suggest that the most effective results would be in cleaning-up of liquor which had been pretreated by dephenolation, biological oxidation, or by use in a froth-flotation plant. The additional cost would be about 3d. per ton of coal processed. A final treatment to remove cyanide might be necessary.

Our summary of this C.T.R.A. report will be concluded in next week's *Chemical Age*.

GAS INDUSTRY'S OUTPUT OF BY-PRODUCTS DOWN IN 1958

NEW gas-making plant of 42.5 m. cu. ft. daily capacity was brought into use during the first six months of 1958 compared with 29 million cu. ft. in the comparable period of 1957.

Coal gas manufacture was reduced by 5% in the first quarter and by 6% in the second quarter, but output of water gas rose by 23%. Production from oil gasification plants increased from 3.9 million therms in April to September 1957 to 12.6 million therms in April to September 1958.

In these same six months, the quantity of coal carbonised was 6% down on the same period in 1957. Coke and oil used in making water gas, however, was 19% and 31% respectively about last year's figures.

There was a fall in surplus gas purchased from coke ovens but increased purchases from oil refineries maintained total purchases some 2½% above last year's level. The total of gas made and purchased was nearly 3% down in the second quarter, bringing the six months' figure to 0.7% below the previous year. Although sales to domestic and commercial consumers showed little change in the July-September quarter, sales to industrial consumers, reflected the fall in industrial production, falling by over 3%; the six-months' sales still showed a 1% increase, however.

In the by-products field, the output of crude tar was reduced by 3½% and the output of crude benzole was 9% lower.

Gas Made and Purchased
(million therms)

	Six months ended Sept. 1957	Sept. 1958	% change
Coal gas	873.8	825.0	− 5.6
Water gas	121.7	149.3	+22.7
Total made	1,011.4	997.5	− 1.4
Gas purchased ...	235.4	241.0	+ 2.4
Total gas made and purchased ...	1,246.8	1,238.5	− 0.7

Products made

	Six months ended Sept. 1957	Sept. 1958	% change
Coke (thous. tons) ...	5,240	4,855	−7.3
Crude tar (thous. tons)	848	818	−3.5
Crude benzole (mill. gall.)	12.0	10.6	−9.2

Appeal to Cut Polymer Tariff Likely

UNOFFICIAL trade estimates indicate that sales of all plastics materials were about 3% higher last year than in 1957. From figures published by the Board of Trade this week it is seen that in the third quarter total sales at home and abroad amounted to 96,700 tons, or 3% more than a year earlier.

In the past year the main change has been in the position of the thermoplastics (including polythene, p.v.c. and polystyrene). Until 1957 these materials had been the most rapidly expanding sector of the industry. In 1958, this sector experienced sharp and rapidly growing competition from imports, particularly of Japanese p.v.c.

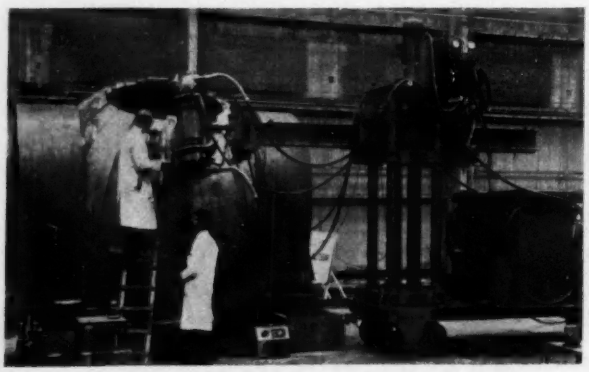
Following the unfavourable decision of the Polymer Tribunal in December, some of the manufacturers are considering an appeal to the Board of Trade for a higher tariff which would be nearer the level of the tariffs existing in the main competing countries (Japan and Italy).

Stocks of thermoplastics are continuing to accumulate, and at the end of the third quarter were, at 37,600 tons, more than 40% higher than a year earlier. Sales of p.v.c. in the third quarter amounted to 17,200 tons, slightly more than a year ago, but prices have been weak and customers are reported as being reluctant to renew long-term contracts.

Output of polythene continued to rise and was now running at about 70,000 tons a year. Sales of all thermoplastics reached 56,500 tons in the July to September period. Exports in the third quarter totalled 27,500 tons.

Third quarter sales of thermosetting materials amounted to 40,200 tons. As in the first half of the year, output and sales were both running at the same level as a year ago.

A.B.P.'s 2¾ in. Thick Stainless Steel Spheres



This sphere, 2¾ in. thick, is under radiographic test by Ashmore Benson, Pease. Two spheres 10 ft. i.d. are being made for British Oxygen Wimpey, main contractors to the M.o.W. chief engineer. Material is 18Cr. 8 Ni. titanium stabilised stainless steel; the vessels are tested to 2,550 p.s.i.

Solway to Raise H_2SO_4 Capacity to 150,000 Tons

DIRECTORS of Solway Chemicals Ltd. have decided to expand their sulphuric acid and cement capacity at Whitehaven by 50%. Their existing plant which was started in 1955 is producing both sulphuric acid and cement at the rate of 100,000 tons a year each.

A third kiln and a sulphur contact plant, plus ancillary services, are to be built.

This has been announced by Mr. Frank Schon, chairman of Solway and of Marchon Products Ltd., both of which are members of the Albright and Wilson Group. He is also a director of Albright and Wilson.

Gas Council Licence New Gasmaking Processes

AGREEMENTS have been entered into by the Gas Council with three companies allowing them to build under licence commercial plants at home and abroad for new gas production process. These processes which have been developed by the research organisation established by the Council, cover a number of developments relating to the production of gas, and coal and oil that are characterised by operation under a pressure of several atmospheres.

The companies to which licences have been granted are the Woodall-Duckham Construction Co., Humphreys and Glasgow and Henry Balfour and Co. Relating mainly to specific research projects, the licences have been granted, the Council states, as much of the work has now reached a stage 'when it is ripe for commercial development'.

New Research Labs. for Pilkington Brothers

WORK has begun on new research laboratories at Lathom Park, Ormskirk, Lancs, for Pilkington Brothers Ltd. It is hoped the laboratories, which form part of an expansion scheme for the company's research department, will be completed by June 1960. They will be used for small, medium and large-scale research work and eventually house 500 employees, of whom 150 will be science graduates.

The buildings will consist of a main block containing an orthodox type laboratory for small scale research work, with offices, a canteen and lecture theatre. There will also be a laboratory for the use of larger equipment and apparatus, and a large-scale laboratory and workshop, where complete new processes can be developed.

I.C.I. Polythene Output up 13%

During the past 12 months, another thousand employees have been started at the I.C.I. Wilton Works. Mr. J. C. H. McEntee, chairman of the Wilton Council, recently said that the total volume of production had begun to increase again. Last year, output of polythene rose by 13% and there was a record tonnage of products based on naphtha.

TEHRAN WATER TREATMENT PROCESS AND ASSOCIATED CHEMICAL PROJECTS DESCRIBED

A WATER treatment process adopted for the water supply of Tehran and pilot-plant investigation into methods of treatment and different coagulants were described at an ordinary meeting of the Institution of Civil Engineers on 6 January by G. A. Meykadeh, director-general, Tehran Water Board, R. L. Fitt, partner, Sir Alexander Gibb and Partners, and T. J. Boddington, partner, Rofe and Raffety (formerly chief engineer, water supply and drainage department, Sir Alexander Gibb and Partners). The choice of coagulant influenced the decision to manufacture chlorine and ferric chloride at the site.

The plant provided departed somewhat in design from the pilot plant. The upward flow in the sludge blanket tank of the pilot plant was 6.5 ft./hour, but in the accelerators installed the range is from 5.25 to 6.45 metres (17 to 21 ft.) and filtration rate, at a maximum of 5.05 m.^{3}/m.^{2}/hour (103 gall./sq. ft./hour) was less than the pilot-plant rate of 120 gall./sq. ft./hour. The present construction provides for 225,000 m.^{3}/day with provision for an extension to 351,000 m.^{3}/day.

Chlorine was chosen for sterilisation after alternative tenders for sterilisation by ozone were rejected on grounds of capital and operating costs.

The decision to manufacture ferric chloride ($FeCl_3$) and to use chlorine (Cl_2) for sterilisation was taken for the following reasons: (a) ferric chloride, being deliquescent, is a difficult material to handle and ship—in liquid form it is very corrosive; (b) supplies of scrap iron are available locally for the cost of collection and haulage; (c) large deposits of salt are readily accessible; (d) the supply of treated water becomes independent of external supplies of chemicals with substantial savings in recurring foreign expenditure; (e) the fact that the manufacture of chlorine is an integral part of the manufacture of ferric chloride contributed to the decision to use chlorine for sterilisation instead of ozone; (f) a market existed for caustic soda, a by-product of manufacture.

The plant covers brine purification, electrolytic chlorine cells, chlorine liquefaction, ferric chloride manufacture, and caustic soda concentration as well as auxiliary units, such as hydrochloric acid manufacture and drum-making plant. The need for 400 tonnes/year of chlorine for sterilisation and 770 tonnes for the manufacture of 1,100 tonnes of ferric chloride determined the cell capacity required at 1,170 tonnes/year.

(Yearly Demands)

	Tonnes
$FeCl_3$ for coagulation (av. 10 p.p.m.)	615
Cl: for $FeCl_3$ manufacture	435
(for sterilization 2 p.p.m.)	123
Cl (losses to absorption) ca	17
	— 575
Caustic soda (net)	630
	Millions of kilowatt/hrs.
Power (chem. manuf.)	2.65

Cost of Chlorine
(Production of 575 tonnes annually Cl_2 (17 tonnes losses).

	Rials
Amortisation and interest	5,152,000
Maintenance	1,782,000
Salt and brine treatment	725,000
Mercury and anode losses	220,000
Power and fuel	2,700,000
Labour	900,000
Total	11,479,000
Deduct value of NaOH recovered	5,040,000
Production cost net 558 tonnes Cl_2	6,439,000
Production cost per tonne Cl_2 (approx.)	11,600

Cost of Ferric Chloride
(Production of 615 tonnes annually $FeCl_3$ (100%)).

	Rials
Amortisation and interest	856,500
Maintenance	260,500
Cl (Rials 11,600 tonne)	5,046,500
Scrap iron (225 tonnes)	90,000
Power	25,000
Labour	900,000
Production cost 615 tonnes $FeCl_3$	7,178,000
Production cost per tonne (Imported cost, c.i.f. Persian Gulf and rail charges: Rials 13,290.	11,670

Comparative Costs of Sterilisation

	Rials/1,000 m^3
1. Chlorine (on production costs)	—
1 p.p.m. chlorine (at Rials 11,600/tonne)	11.6
Cost of chlorinators and instruments	2.25
Total	13.85

2. Ozone (estimated on August 1951 tenders)
Plant capacity (300,000 gall./day or 1.25 p.p.m.

	£
Plant cost (without generators	212,000
	Rials
Buildings (estimated)	7,000,000

	Plant	*Buildings*	*Total Rials*
Interest and Amortisation	3,812,000	353,000	4,165,000
Maintenance	1,696,000	28,000	1,724,000
Power av. dose 1 p.p.m. ozone for 61,500,000 m^3.	—	—	30,200,000
Labour Cost (1p.p.m.ozone)	—	—	450,000
Total			9,539,000

Rials 155/1,000 m^3.

Brine Purification. Raw salt is mined locally and is of variable quality. The treatment process is based therefore on the following upper limits of impurities:

	%	
Insoluble (sand)	2.0	
CaO	1.8	soluble in acid
MgO	0.1	" " "
SO_3	2.5	" " "
Fe	0.5	" " "

Spent brine returned from the cells at a rate of 6 to 7 m.^{3}/hour is regenerated by addition of lump salt direct into the saturation tanks. The spent brine is dechlorinated and mercury is recovered. Sniff gases pass to ferric chloride manufacture. The brine is heated to 60°C by steam from the caustic soda evaporation plant and from an oil-fired boiler. Barium chloride, sodium carbonate, and caustic soda are added as necessary. After passing through the precipitation tanks and filters at a rate of between 0.32 and 0.4 m.^{3}/m.^{2}/hour, the hot purified brine is acidified by hydrochloric acid and finally mixed by compressed air in storage tanks (capacity 135 m.^{3}).

Electrolytic Cells. The rated output of the nine cells is 2.1 tonnes/day, but when the 12 cells planned are installed it will be 3.2 tonnes/day. The cell rating is 0.3 tonnes/day of chlorine with a current efficiency between 93 and 96% at 10,000 amp. and an anode-to-cathode voltage-drop of between 4 and 4.3.

The primary cell has a moving mercury cathode and adjustable graphite anodes and is ebonite lined. In the secondary cell, also ebonite lined, the mercury is separated from the 50% caustic soda solution and is pumped back to the primary cell. The spent brine is recirculated through the saturation and purification plant. Hydrogen given off at the cathode is cooled and with chlorine is passed through the combustion chamber to make as much hydrochloric acid as is required for the main process.

Ferric Chloride

Chlorine Liquefaction. The gas collected at the anode and required for the manufacture of ferric chloride is passed, after preliminary cooling to the absorption tower. That for liquefaction is cooled in water-jacketted coils; dried with sulphuric acid in chemical stoneware turbo-driers; compressed to 1 kg./cm.^{2} in a Nash Hytor nickel-cast-iron and stainless-steel compressor rated at 60 m.^{3}/hour; filtered under pressure through glass wool; secondarily cooled; and liquefied in a refrigerator by means of heat exchange with a Freon evaporation operating between temperatures of −38°C to +35°C (Freon) and 30°C to −33°C (chlorine) at full output. Sniff gases are piped to the auxiliary plant for calcium hypochlorite.

The liquid chlorine is stored in two steel tanks each of 36 tonnes capacity.

Ferric Chloride Process. This is based on the dissolution of iron by ferric chloride ($FeCl_3$) to make ferrous chloride ($FeCl_2$) and the absorption of Cl_2 by $FeCl_2$ to make $FeCl_3$. Scrap iron (0.36 tonnes per tonne $FeCl_3$ (100%)) is added to the dissolution tanks with $FeCl_3$ and water. $FeCl_2$ is filtered through sand and via an intermediate tank, is pumped through three heat exchangers in series to the top of the absorption tower, up which chlorine is drawn by suction. After cooling, mixing, and measuring, it is pumped to main storage or to the constant-head tank to supply, by gravity, the chemical-solution tanks in the water-treatment plant.

Internal pipework, pumps, and similar plant are of structural carbon steel, the absorption towers of stoneware, the dissolution tanks of concrete lined with

acid-proof tiles and bricks set in water-glass putty, the main storage tanks of concrete, lined with two layers of ceramic tiles in water-glass putty on bitumen primer, and the external pipe-work of ebonite-lined steel. Storage capacity of 150 m.³ (40%) solution. Tail gases from the absorption tower are led to the calcium-hypochlorite plant.

Caustic Soda. The yield per tonne of chlorine is 1.1 tonnes of solid sodium hydroxide and the installed capacity is 4 tonnes/day. Caustic soda, separated from the mercury in the secondary electrolytic cells, is passed to receiving tanks (58.5 m.³ capacity) and gear pumps deliver at a rate of 0.6 m.³/hour (at specific gravity 1.5 and temperature limit 70°C) through filters for concentration in nickel-clad steel evaporation pots. Caustic soda (98% NaOH) is drawn off at a temperature of 320°C. Fuel-oil consumption is 180 kg./tonne of caustic soda produced. The caustic is sold in drums either solid or flaked.

Calcium Hypochlorite. For safety and to obviate nuisance, sniff and tail gases from various parts of the plant (such as brine dichlorination, ferric-chloride-absorption tower, and chlorine liquefaction) are collected and passed up through calcium hydroxide for the manufacture of a solution of bleaching powder ($CaOCl_2$).

Services and Auxiliary Plant. Water is circulated throughout the plant for cooling and generally air is used for mixing. The power supply is direct from the main switchboard. Direct current for the electrolytic cells is supplied through further transformers and oil-cooled selenium rectifiers with an output of 10,000 amp. at 25-55 V. Equipment is installed for testing drums and cylinders, for filling them with chlorine, and for weighing. Non-returnable steel drums for solids and flaked caustic soda are fabricated at site. Output is 40 to 50 drums per day in sizes 71 to 30 cm. diameter by 92 to 30 cm. deep.

Chemical-solution Pumps. Wear has exceeded expectations and an acceptable replacement has not been found.

Capital Cost

Total cost = £ 6,098,730 + 1,078.84 millions of Rials
= £11,492,930 (Rials 2,298.58 millions)

	£ sterling	+ millions of Rials
Treatment works	369,090	+102.03
Ancillary works	20,000	+91.93
Power generation and distribution	140,550	+6.70
Chem. Manuf. plant ...	211,100	+40.20
Misc. costs (house-connection, meters, imported chemicals, etc.	1,295,400	—

On the basis of the installed capacity (225,000 m.³/day) cost per 1,000 m.³/day is approx. Rials 9,06,4500 £206 per 1,000 gall.).

Treatment Works

	Foreign Currency, %	Cost per Unit Capacity: Rials per 1,000 m.³/day	£ per million gall./day
Coagulation and Sedimentation	41	174,500	3,970
Filtration, sterilisation and treated-water tank	41	420,000	9,550
Overall, incl. site development	38	724,000	16,400

Chemical Manufacturing Plant

Cost (Cl_2 + NaOH)/tonne Cl_2/day.
(Capacity 2.1 tonnes/day)*

	Rials	£
Plant	24.6×10^4	123,000
Buildings	13.2×10^4	66,000
Total ...	37.8×10^4	189,000

Cost per tonne ($FeCl_3$/day)
(Capacity 3.2 tonnes/day)

Plant	1.21×10^4	6,050
Buildings	0.20×10^4	1,000
Total		

*Additional cost to bring capacity up to 3.2 tonnes Cl_2/day is estimated at Rials 6 million (£30,000).

Proportion of Erection Costs

Ratio of erection cost to supply cost for:

	%
Water treatment plant	9.5
Diesel generators, switchgear electrical distribution	9
Waste-heat boilers	50
Chemical manufacturing	27

Unit Costs of Production
(Capital and Maintenance Charges)

Plant	Amortisation	Maintenance
Water treatment ...	1.36 % for 35 years	2%
Chemical	4.99 % for 15 years	4%
Pipelines	1.36% for 35 years	0.7%
Generating & Pumping	2.40 % for 25 years	3.0%

Rates of Exchange

£1 Sterling = U.S.$2.80
= French francs 980
= Swiss francs 12.12
= German DM.11.70
£1 Sterling = Rials 200 (approximately average conversion rate over whole period of the work)

Acrylonitrile Towers at I.C.I.'s Cassel Works Begin to 'Command Landscape'

AN exacting year ahead is the suggestion of I.C.I.'s Billingham Division chairman, Mr. W. J. V. Ward. The past year has seen, he notes, an interruption to the rapid and continuing expansion of almost all sections of trade and industry both in the U.K. and abroad. On the fertiliser side he reports that the new C.C.F. and 'Ntiro-Chalk' plants recently started, are doing well.

The external factories of Billingham Division as a whole had their best year of operation in 1958, and outputs in many cases had exceeded all previous annual figures. Their combined contribution to the division's production had been impressive, reports Dr. C. J. Bridger, the external factories manager.

At Dowlais the operation of plants had been both steadier and more efficient and the total production had consequently been a record. In particular, production on the existing plants at I.C.I. Heysham had been at a record level while the nitric acid plant and the much enlarged 'Nitro-Chalk' plant had contributed to the manufacture of an improved product. Work has started, Dr. Bridger states, on installing further extensions of the methanol plant.

At Prudhoe, there had been some 'unusual setbacks' but an important modification had been successfully installed and had resulted in improving the sulphate plant capacity. The Clitheroe extensions, opened in September 1957, had resulted in the total tonnage of catalysts made in 1958 being considerably higher than in any previous year.

The first year of I.C.I.'s new division, the Heavy Organic Chemicals Division, chairman Dr. S. W. Saunders, reports has, on the whole, been a good one, although not as good as they had hoped in some respects. Output and activities of all departments were higher than before.

Dr. Saunders stresses that the chemical industry, along with most other industries in the country has a tough competitive time ahead.

'A year of solid achievement' was the description given to the year 1958 by Dr. H. R. Hailes, Cassel works manager. The Cassel Works, he states, do not appear to have been affected by the temporary recession in trade earlier in the year, and fairly high outputs have been maintained throughout.

One or two setbacks occurred in that the work on the Downs sodium plant had been temporarily suspended, and the requirement of vinyl chloride was reduced half-way through the year. The extension had been left in such a way that when the word is given work could be taken up where it was left off. Vinyl chloride production has only recently been stepped up, and even now was not on full load.

During the year, Dr. Hailes records, the extensions to the methyl methacrylate plant had been fully commissioned, and while full output had not been asked from them, a great deal of work in preparation for that day had been done. The cyanide plant had been working at full output and the chlorobenzene plant was getting nearer and nearer to normal operation at designed capacity.

On the site of the old acetic plant the tall towers and structures of the acrylonitrile plant are noted by Dr. Hailes as 'beginning to command the landscape'.

Plastics Works, Billingham, according to Dr. A. M. Block, manager, have had a steady and satisfactory year. Progress has been made and the outlook is 'both challenging and promising'. In production, there have been no striking increases, but in 1958 in each Plastics Division plant at Billingham, output was just greater than in 1957.

The new Diakon moulding materials plant is expected to be in production early this year. Successful development of new uses for the products is expected to enable the plant output to be built up to its final capacity during the next two or three years. Major factors in this development are stated by Dr. Block to be improvements in the product quality and the substantial price reduction due from 1 January.

This year will see the Plastics Works embarking on a new venture as far as Billingham is concerned in the nylon compositions plant. The production of coloured nylon compounds has now been transferred permanently from the Hillhouse factory to Billingham.

PEOPLE in the news

● The following were mentioned in the New Year Honours List in addition to the names given in CHEMICAL AGE last week: J. W. LAING, president, John Laing and Son Ltd. was created a Knight Bachelor. PROFESSOR M. L. E. OLIPHANT, director of the School of Research in Physical Sciences, National University, Canberra, received a K.B.E. The C.B.E. was awarded to W. A. S. BUTEMENT, O.B.E., chief scientist, Australian Department of Supply; while F. B. SHORLAND, director, New Zealand Fats Research Laboratory, was awarded the O.B.E. I. E. NEWNHAM, principal research officer, Division of Industrial Chemistry, Commonwealth Scientific and Industrial Research Organisation, Melbourne, received the M.B.E. J. FORSTER, leading hand fitter, I.C.I. Alkali Division, was awarded a B.E.M.

● MR. C. F. GYSIN retired at the end of 1958 as chairman of the board of Geigy (Holdings) Ltd., Manchester, after almost 50 years with Geigy and as a result a number of changes have taken place as from 1 January in the boards of the companies of the Geigy group in Britain. MR. E. G. TURNER succeeds Mr. Gysin as chairman of Geigy (Holdings) Ltd., with MR. H. L. ADDLESHAW continuing as deputy chairman. MR. H. CLAYTON succeeds Mr. Turner as chairman of the Geigy Co. Ltd., with MR. H. JONES as deputy chairman. MR. H. JONES and MR. G. A. CAMPBELL become joint managing directors. MR. H. L. ADDLESHAW succeeds Mr. Gysin as chairman of Ashburton Chemical Works Ltd., Trafford Park, Manchester, with DR. F. BUCHMEIER as managing director. On the board of James Anderson and Co. (Colours) Ltd., Paisley, MR. A. H. WHITAKER succeeds Mr. Gysin as chairmen and MR. A. A. R. OSBORNE and DR. D. M. STEAD become joint managing directors.

● MR. A. C. VIVIAN, M.I.C.E., managing director of Metal and Pipeline Endurance Ltd., has recently joined the board of General Descaling Co. Ltd.

● New directors who have been appointed to the board of Vinatex Ltd. are MR. H. D. BRETT, MR. C. N. FORD, DR. H. REICHARD, A.R.I.C., MR. R. M. RINGWALD, B.Sc., A.R.I.C. MR. D. H. EVANS now becomes chairman in addition to his duties as managing director.

● THE EARL OF HALSBURY, managing director of the National Research Development Corporation, and MR. SYDNEY BARRATT, chairman of Albright and Wilson, are to be invited to join the board of Joseph Lucas (Industries) on 1 April. Lord Halsbury is to retire from the N.R.D.C. at the end of next March.

● During a recent visit to Canada, the U.S. and Mexico, MR. S. H. ELLIOTT, managing director of H. J. Elliott Ltd., E-Mil Works, Treforest Industrial Estate Pontypridd, Glam., appointed additional stockists and distributors of the E-Mil Green Line and Gold Line brands of volumetric glassware, thermometers, hydrometers and viscometers. The new range of apparatus, which provides time saving devices and greater accuracy, was well received both by dealers and users, in spite of the fact that the greatest brake on the company's expansion of sales in the U.S. is the import duty of 42½%. While in the U.S., Mr. Elliott re-visited many of the factories engaged in producing similar types of apparatus.

● MR. B. T. MINTER, a director of British Titan Products Co., has retired. He joined the company in 1934 and was appointed to the board in 1946.

● MR. H. P. N. BENSON has been appointed deputy managing director of the A.P.V. Co.

● MR. JAMES SIMPSON has been appointed deputy chairman of the Woodall-Duckham Construction Co. He will carry special responsibilities relating to subsidiary companies within the group at home and overseas, and in this connection leaves on 12 January for a six-months' visit to Australia and New Zealand. MR. E. N. WENBORN has been appointed a joint managing director of the company.

● At St. George's Hall, Bradford, on 31 December before 600 senior grammar school pupils, MR. H. P. HODGE, manager of chemical market research and development for the Esso Petroleum Co., gave a lecture entitled 'New horizons for oil'. He showed the pupils examples of plastics, synthetic rubbers, detergents, paints, agricultural chemicals and clothing, all of which were made from petrochemicals.

● MR. F. J. BELLENGER and MR. T. H. B. CHADBORN have been appointed additional directors of Lacrinoid Products Ltd.

● MR. STANLEY ADAMS, vice-chairman of Bakelite Ltd., has been elected chairman. He succeeds MR. HOWARD V. POTTER, who has retired but continues as director. Mr. Potter has been actively associated with Bakelite Ltd. for more than 45 years. He is one of the pioneers of the plastics industry and worked with Sir James Swinburne and others in the development of phenolic plastics in Britain. He is also president of the British Plastics Federation and a past president of the Plastics Institute. His other offices have included founder chairman of the Plastics and Polymer Group of the Society of the Chemical Industry, chairman of the Association of Chemical and Allied Employers, and member of councils of F.B.I., A.B.C.M. and B.S.I.

● SIR ARTHUR P. M. FLEMING has retired from the board of British Industrial Plastics.

● Acheson Industries (Europe) Ltd. announce that MR. C. R. WILLS, B.Sc. Eng.(London), has been appointed general manager of Acheson Colloids Ltd., Plymouth.

● DR. W. R. MOORE, B.Sc., Ph.D., F.R.I.C., reader in high polymer chemistry, Department of Chemical Technology, Bradford Institute of Technology, Bradford 7, who gained the M.B.E. in the New Year Honours List, regards the honour as having been made not only to himself but to the group of colleagues and research assistants who have worked with him on cellulose derivatives over the past few years. He took his B.Sc. with first-class honours in chemistry at Chelsea Polytechnic, where he was a lecturer and where he carried out some research before the war. During the war he worked on explosives research for the Ministry of Supply and went to Bradford in 1946 as a lecturer in physical chemistry. He became senior lecturer in 1951 and was appointed to his present post last year. Dr. Moore gained his Ph.D. for physico-chemical work on cellulose nitrate. Since 1951 he has been directing the research work of a group concerned with the study of solution properties of cellulose derivatives; it has published between 20 and 30 research papers on the subject. Dr. Moore hopes to give a paper at the International Polymer Conference in Wiesbaden next October and has been invited to contribute to an American Chemical Society symposium on cellulose derivatives in April 1960. He has lectured at various summer schools on polymer chemistry and has organised symposia on this and other chemical topics.

W. R. Moore

● MR. H. C. TETT, formerly a managing director and chief executive of Esso Petroleum Co. Ltd., has been appointed chairman and managing director of the company following the retirement of SIR LEONARD SINCLAIR. Mr. Tett read physics and mathematics at the University College of the South West. Later he was awarded the Diploma of Imperial College for research work on combustion and tetraethyl lead. He joined Esso in

(*Continued on page* 98)

Chemist's Bookshelf

THEILHEIMER'S COMPREHENSIVE VOL. 12

SYNTHETIC METHODS OF ORGANIC CHEMISTRY. Vol. 12. By *W. Theilheimer*. S. Karger, Basle/New York and Interscience Publishers Ltd., London. 1958. Pp. xvi + 546. SFr.92.

THEILHEIMER has unquestionably established itself as one of the major reference works of practical organic chemistry since its first appearance twelve years ago. Its success may be attributed both to the usefulness of its aims and the admirable manner in which it achieves them. There is no other work in the English language which sets out to provide up-to-date coverage of such a diverse range of organic syntheses (and incidentally there is a wealth of information to stimulate the degradative chemist). The value of such a compilation must then depend firstly on the editor's judgement in the selection of examples, accurate and sufficiently detailed documentation and an efficient system of indexing. One can only marvel at the comprehensive nature of Dr. Theilheimer's selection for, as in previous volumes, a very diverse range of topics indeed is presented; by far the majority are clearly of general use while the few that appeared to the reviewer to be unduly specialised, may well find a happy application in someone's laboratory. The information given is frequently sufficiently detailed for experiment without further consultation of the literature.

In a number of instances the experimental sections of papers have been scrutinised for a useful procedure which might well have eluded the chemist in the course of his ordinary reading. Whatever the merits of the system of classification that has been adopted in this series, the index is altogether admirable and provides a quick and simple independent means of directing one's inquiry to the appropriate section of the work. Moreover, the editor is endeavouring to make the series cumulative and has, accordingly, so arranged and indexed his material that nothing of relevance contained in earlier volumes should escape the inquirer's attention. The main text covers the literature from 1955-57, while the chapter 'Trends in Organic Chemistry,' first introduced in 1954, brings the coverage (although not in detail) on selected topics up to April 1958. A few of the less orthodox structural formulæ are not very happily drawn and there are some very minor errors, but these exceptions apart, this volume maintains the high standards of accuracy and presentation set by its predecessors.

K. H. OVERTON.

Kinetics of Vinyl Polymerisation

THE KINETICS OF VINYL POLYMERISATION BY RADICAL MECHANISMS. By *C. H. Bamford, W. G. Barb, A. D. Jenkins* and *P. F. Onyon*. Butterworths Scientific Publications, London. 1958. Pp. xii + 318. 50s.

DEVELOPMENTS in polymer chemistry have been so numerous in the past decade that even those engaged in academic research on the various aspects of macromolecules must find it difficult to keep abreast of more than their own particular small part of it. Several recent publications have summarised various portions of the field and in this volume four authors have combined to present a critical review of their own special interests.

This volume will be found invaluable by polymer research chemists and both readable and interesting to all with the necessary background engaged in the several industries making and using high polymers. Of necessity it requires a post-graduate standard of chemistry and a working knowledge of mathematics to follow the text but this will not unduly restrict the demand for it.

Commendable forethought has been shown by the authors in the preliminary notes and the introductory chapters to define the field they cover and explain the fundamentals of vinyl polymerisation. They then proceed to discuss the kinetics of homogeneous and heterogeneous polymerisation particularly with reference to the principal vinyl monomers. Considerable attention is paid to the various types of co-polymerisation and also to the mechanisms of catalysts and inhibitors. In the final chapter the statistics of molecular weight distribution are discussed, the treatment being inevitably highly mathematical.

In order to simplify the mathematical treatment various approximations are used, e.g., it has been assumed that a single velocity constant can be used to characterise all the steps in the polymerisation of a specific monomer. The effect of these assumptions is adequately discussed in the opening chapters and forms a useful prelude to the detailed considerations which follow in the main chapters in the book. Styrene, methyl methacrylate and acrylonitrile, being the monomers on which most work has been done, naturally predominate in the work reviewed but other monomers do receive attention, particularly in the chapter on co-polymerisation. A positive effort is made, however, to keep the treatment theoretical and to use specific reactions to illustrate principles and to maintain a strictly academic approach to the kinetics of the reactions discussed.

As the authors have themselves worked on their subject for many years they naturally draw frequently on their own work but the wealth of references includes the work of all the important schools of research in the U.S. and Europe. Preparation of a review of this type takes a considerable time during which the work goes on but much of the work referred to has only been published in the last two years. The temptation to enlarge their subject matter in the light of recent developments in allied fields must have been strong but commendably they have refrained and the book should become a standard work of reference on this limited, but important part, of the chemistry of high polymers. As a final note the four joint authors are to be congratulated on the success of their collaboration. The volume is completely integrated and not, as is so common in recent years, a collection of chapters by several individuals.

J. H. COLLINS.

De Clerck's Detailed Survey of Brewing

A TEXTBOOK OF BREWING. By *Prof. Jean De Clerck*. (Translated *by Kathleen Barton-Wright*). Chapman and Hall, Ltd., London. Vol. 1, pp. xx+587, 1957, 84s net; Vol 2, pp. xx+650, 1958, 105s net.

THESE two volumes are conceived necessarily on a magnificent scale because of the diversity of a subject which ranges from the pure science of barley and malt constituents, of hop chemistry and of yeast characteristics to the technology of such questions as the design of malt mills, refrigerators, bottling machines and factory services generally. It may be said at once that both volumes will appeal particularly to the practical reader who requires a fairly detailed survey written mostly from first principles, liberally provided with references and without undue bias towards any one system of malting or brewing. The style throughout is direct and factual while the fluidity of expression says much for the excellence of the translation.

The work as a whole well reflects the empiricism which is so marked in many traditional industries and it is therefore truly scientific only to an uneven extent. For instance, to take a single trivial example, it is stated 'A pale malt should therefore be well cured. . . .' but an adequate objective assessment of what constitutes good curing is elusive and the statement really means that in the light of empirical experience a pale malt may be cured at a relatively low temperature but the duration of curing should not be curtailed. Again it would be too much to expect a work with so wide a field to cover to be wholly up to date especially in relation to recent research, but minor shortcomings of this kind will be unimportant to the majority of readers who

will perhaps be seeking guidance with regard to current practical problems.

The first volume is concerned almost entirely with a description, against what is essentially a background of chemistry, of the raw materials of brewing and of the processes involved. The chemical background is frequently reflected, by reference to laboratory results and Vol. 2 is mostly devoted to a description of laboratory procedures and recipes. The latter are often *ad hoc* in nature in that the methods have been elaborated from a purely analytical approach in order to express results on a numerical scale without their necessarily referring to chemical entities. This character was, however, inevitable if the text were to reflect current methods satisfactorily and certainly the account itself is likely to prove extremely welcome to those engaged upon routine work in brewing laboratories even if some of the methods are unfamiliar and little used in this country. Its acceptability is probably still further assured by the wide spectrum of topics which it covers. Apart from the anticipated technical examinations of brewing materials, these topics include such diverse subjects as the analytical control of boiler feeds, quaternary ammonium compounds, proteolytic enzymes and of lubricating oils.

While Vol. 2 is more of a laboratory handbook, Vol. 1 well provides a broad picture of the industry itself. Perhaps neither contains much which cannot be located, even if with some difficulty, in the existing literature, but they are still likely to be very welcome to all engaged on either experimental or technical aspects of malting or brewing.

A. H. COOK.

Revised Organic Chemistry for Students

AIDS TO ORGANIC CHEMISTRY FOR MEDICAL STUDENTS. Fifth Edition. By *George A. Maw*. Bailliere, Tindall and Cox. London. 1958. Pp. vii + 176. 10s. 6d.

DR. MAW'S book is virtually an entirely new edition of a work which has long been familiar to medical students. It covers a remarkable amount of ground within its 170 small pages and makes useful contact with many compounds of biochemical interest, including steroids, ADP and ATP. The author never loses sight of fundamentals and his chapters on isomerism (including the optical isomerism of the lactic acids and the tartaric acids) are particularly clear summaries. It is refreshing, too, to find a much more satisfactory treatment of the structure of urea than is usual at this standard.

The style is, unavoidably, condensed—which leads to occasional lapses of scientific accuracy. The book assumes that the reader has some knowledge of physical chemistry, of atomic structure and the electronic theory of valency. It would, therefore, serve him best as a companion to a good course of lectures on organic chemistry, rather than as an introduction to the subject, to be used independently.

K. STUART.

Chemist's Bookshelf

Textbook on Rubber Analysis

THE ANALYSIS OF RUBBER AND RUBBER-LIKE POLYMERS. By *W. C. Wake*. Maclaren and Sons Ltd. 1958. Pp. x + 237. 50s.

COMPARED with many of our major industries the analytical chemistry of rubber is ill-served in the matter of text books, for since the standard works of Tuttle in 1922 and the U.S. translation of Memmler in 1934, both of which treated analysis with the cursory attention typical of their day, we have had no significant publication in the English language on this subject. Apart from individual literature contributions, the rubber industry has been 'making do'—there is no other term for it—with the recommended methods of the two standardising bodies, the British Standards Institution and the American Society for Testing Materials through some of the most challenging years of its existence. It is to the credit of these organisations, if not to the industry, that their publications have attained something approaching textbook status in the library of every rubber laboratory.

Dr. Wake has gone far to put matters right. We have here a view of rubber analysis against an adequate background of physical chemistry. We are, as far as is possible in any scientific textbook these days, brought virtually up to date. Although the line between the rubbers and the plastics has become difficult to define, the author sets a limit to the scope of his work which most readers will consider reasonable or even generous. These new materials, of course, demand new analytical techniques and these in turn have dictated a departure from the conventional pattern of natural rubber analysis to one which many will find strange, but surely more logical. Thus we find early in the book a chapter, one of the longest, devoted to the qualitative identification of polymers, while elemental analysis gets adequate treatment in another long chapter. However, this approach, welcome and necessary as it is in dealing with the subject as a whole, does lead to some lack of consistency in presentation. Carbon black, for instance, has a chapter to itself even though this entails a certain overlap with the subject matter in another chapter, while sulphur, of equal importance, surely, for technologist and analyst alike, has been severely decimated and we have to search diligently in three separate chapters if we wish to learn the whole story. Extraction and dissolution processes are presented, each in a separate chapter, with a lucid survey of the physico-chemical theory behind them.

In addition, there are chapters on pyrolysis techniques, on the functional group determination of polymers, and on ashing. All these topics are presented clearly, critically and with a nice balance of theoretical and practical considerations. The modern analytical tools of U.V. and I.R. spectroscopy are mentioned at an introductory level. To treat absorption spectroscopy as a thing apart is certainly not the way to get the best out of this or any technique; on the other hand, comprehensive and thorough treatment must be left to the specialist. In spite of the dilemma, the reviewer feels that more might have been done to bring this section into line with the rest of the book.

Finally, how welcome is the chapter on statistical methods. Dr. Wake brings us round to the correct way of looking at this matter which is that statistics should be used to improve the quality of analytical interpretation.

It is no exaggeration to say that Dr. Wake's book gives the first comprehensive treatment of the subject ever to appear, and one can confidently prophesy that it will remain a standard work for many years hence. Many will read this book with pleasure for the style is attractive, the arguments clear and the instructions precise. For their profit, let us hope that as many will mark, learn, and inwardly digest it.

F. C. J. POULTON.

New Volume on Organic Chemistry

PROGRESS IN ORGANIC CHEMISTRY. PROGRESS SERIES. Vol. IV. Edited by *J. W. Cook*. Butterworths Scientific Publications, London. 1958. Pp. + 256. 50s.

THIS volume maintains the uniformly high standard which we have come to expect from a series of monographs written by experts in the chosen fields. In 'Naturally occurring unsaturated fatty acids', F. D. Gunstone presents an excellent review of the synthetic methods used in this field together with a description of some recent structural work on these compounds. Chapter 2 consists of a timely monograph on 'Free valence in conjugated molecules', by B. T. A. Pullman in which both valence bond and molecular orbital methods are fully illustrated.

In the third chapter W. B. Whalley discusses some 'Oxygen heterocyclic fungal metabolites' including citrinin, fuscin, fusarubin griseofulvin and some allied compounds. Structural determinations are described in detail and biogenetic considerations are discussed in this and the succeeding chapter on naturally occurring β-triketone systems by C. H. Hassall. The latter review contains an intriguing account of the constituents of *Aspidium Filix mas*, kousso, hop resin

(*Continued on page* 98)

People in the News

(*Continued from page 95*)

1928 as an assistant in their technical sales department and became manager of that department in 1935. In 1939 he transferred to the International Association (Petroleum Industry) Ltd.

● MR. L. J. CRITCHELL, a director of Potter and Clarke, has been appointed managing director. He succeeds COL. R. W. WREN, who has retired as chairman, managing director and from the board due to ill-health. A new chairman has yet to be appointed.

● MR. CECIL DOTSON has been appointed chairman of Texas Instruments, first European subsidiary of Texas Instruments Inc. Mr. Dotson succeeds MR. P. E. HAGGERTY, president of the parent company.

● MR. JOHN R. G. FISON, of Fisons Ltd., has retired from the company and relinquished his seat on the board. Mr. Fison, the brother of the present chairman, SIR CLAVERING FISON, began his service with the company in South Africa in 1926.

● PROFESSOR T. P. HILDITCH, C.B.E., F.R.S., professor of industrial chemistry, Liverpool University, will be guest of honour at the luncheon to be held on 17 March in connection with the eleventh technical exhibition of the Oil and Colour Chemists' Association. The exhibition will be held on 17, 18 and 19 March at the New Horticultural Hall, London S.W.1. Admission will be free and copies of the official guide and further information can be obtained from Mr. R. H. Hamblin, general secretary, Memorial Hall, Farringdon Street, London E.C.4.

● MR. R. HUSSEY, for several years manager of the Power Plant Division of Elliott Bros. (London) Ltd., has now been appointed sales director of James Gordon and Co. Ltd., Dalston Gardens, Stanmore. The division has been amalgamated with James Gordon and Co.

● MR. J. S. PARKER, manager, Lobitos Oilfield Ltd.'s refinery at Ellesmere Port, Cheshire, since 1933, retired from that post at the end of 1958 but remains with the company in a consultative capacity. He is succeeded as refinery manager by A. CLUER, formerly process superintendent and assistant refinery manager, who has been with the company since 1934.

● In accordance with his intention announced in October 1957, MR. JOHN H. LORD has retired from his executive duties as a managing director of the Dunlop Rubber Co. He will remain a member of the board.

● MR. K. D. MORGAN joined the staff of Head Wrightson and Co. Ltd., on 1 January, as a sales representative for iron and steel castings and forgings. Mr. Morgan will be based in the London office at 20, Buckingham Gate, London S.W.1.

Chemist's Bookshelf

(*Continued from page 97*)

and some essential oils. The chemistry of usnic acid is also discussed. Two minor criticisms of these first three chapters on natural products are that, presumably for the sake of brevity, light absorption data are not discussed, while in chapter 3 current concepts of biogenesis via phenolic oxidation have not been included.

The most substantial chapter consists of a fascinating and masterly account of degradation and synthesis of peptides and proteins by A. H. Cook and G. Harris. This is indeed a most useful summary of the field and the references (of which there are nearly 500) are mainly to very recent work.

The last chapter by F. G. Mann is concerned with heterocyclic derivatives of phosphorus, arsenic and antimony. The emphasis here is on recent synthetic methods, and cyclisation procedures are discussed in detail.

The work is free from all but minor errors (e.g. formula (129) p. 102) and is most reasonably priced. It is a pleasure to recommend this new volume to all interested in progress in organic chemistry.

A. I. SCOTT.

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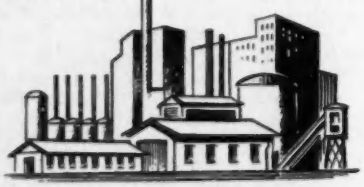

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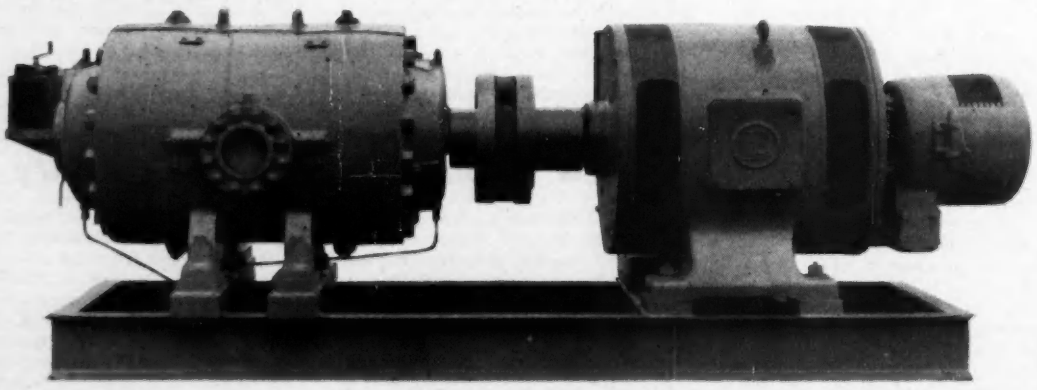

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Overseas News

DUTCH CHEMICAL OUTPUT UP BUT DEVELOPMENT BELOW DESIRED LEVEL

ONE of Holland's largest chemical associations gives in its annual report full details in statistical form of the recent rapid development in the country's chemical industry. Despite the growth of Dutch chemicals, however, the association says that a more vigorous approach to markets by manufacturers is desirable; the Dutch trend is by no means the best in Western Europe and could be boosted.

Figures for 1957 showed an increase in chemical production of 8% over the previous year, as compared with 11% in Austria, 12% in Western Germany and 16% in France. In the first half of this year, too, Dutch development was below what was desirable, the 3% increase attained being only half of the combined development within the O.E.E.C. block. Although national comparisons are odious, says the association's report, it is obvious that the Dutch chemical industry has not been making the dynamic progress desirable.

1958 Increase Foreseen

Turnover of the Dutch chemical industry in 1957 was guilders 2,030 million (about £203 million) as against guilders 1,860 million (about £186 million). 1957 was a particularly good year for production by Dutch standards, the 8% increase comparing with one of 5% the previous year. Nitrogen fertilisers, perfume products, glues, gums and adhesives were the top development products. The 1957 chemical production index number was 133 (1953 = 100) as compared with 123 in 1956. For 1958 a year's increase in production of 3% is foreseen by the report.

Exports by the country's chemical industry in the first half of 1958 were, at $139 million, 4% up on those in the corresponding period of the previous year. However, even taking into account an overall fall in prices in the chemical field of nearly 2%, it seems, says the association, that any rapid development in exports is now at an end. Organic chemicals have been and will be the types with the best development potential in the export field.

Union Carbide Form Belgian Company to Produce Polythene

A new Belgian company, Cobenam, S.A., to manufacture polythene, has been formed by the Union Carbide Corporation. The company will be owned jointly by Union Carbide and Societe Chimique des Derives du Petrole S.A., 'Petrochim.' The latter is an affiliate of Societe Generale, and other important Belgian financial groups.

The plant will be situated near Antwerp between the Petrochim chemical plant and the Societe Industrielle Belge de Petroles (S.I.B.P.) refinery. Raw materials will come from S.I.B.P. Union Carbide, will provide the technical 'know-how.' Plans drawn up call for the construction of a plant having an initial capacity of 30 million lb. of polythene annually with production estimated to commence in mid-1960.

Cobenam S.A., will represent the third Union Carbide investment in European polythene production facilities.

Bayer to Introduce 40-hour Week

Farbenfabriken Bayer A.G., Leverkusen, have drawn up plans for the introduction of a 40-hour week within the plant. No date is given for this step but the ground has been prepared and it is estimated that the change can be made without enlarging the present labour force.

New Brazilian H_2SO_4 Plant

The new sulphuric acid plant of Quimbrasil recently brought on stream in Brazil will produce 120 tons a day for the production of superphosphates.

The new firm of Corsolo Industria e Comercio de Corretivos de Solos S.A. has been set up in Sao Paulo with capital of Crs 4.5 million for the production of fertilisers and insecticides.

New Chemical Plant Planned by Swedish Company

Subsidiary company of AB Mo- and Domsjo, of Sweden, Benol AB, are to set up a chemical factory at Stenungsund on the west coast of Sweden for the production of raw materials for synthetic lubricants, etc.

Reichhold's Canadian Phenol and Formaldehyde Project

Engineering is being carried out for the erection of a sizeable phenol plant and formaldehyde unit at the Port Moody, British Columbia plant of Reichhold Chemicals (Canada) Ltd. The company also plans another phthalic anhydride plant at Ste Therese, Quebec. These plants will look after the increased captive use of these materials and the ever increasing demand for domestic and export purposes.

Du Pont Plan Expansion of Polythene Output

New plans for expansion of their polythene facilities announced by E.I. Du Pont de Nemours Co., U.S., will add to the potential surplus of the material in the U.S., but will enable the company to compete in the low-pressure polythene field. Although Du Pont have had a pilot plant for production of linear or high density material produced by low pressure, they have until now been producing high-pressure conventional polythene. The new plant will be located at Saline River, Texas, and is scheduled for completion by mid-1960. Capacity has not been announced.

Erdoelchimie's Capital Increased

B.P. Benzin und Petroleum and Farbenfabriken Bayer A.G., who are equal partners in Erdoelchimie of Leverkusen, have raised the company's capital from the nominal DM.50,000 to DM.87½ million (£7.3 million), each contributing equally to the increase. On current plans total investment in this petrochemical undertaking is expected to rise to DM.300 million (£25 million).

First stage of Erdoelchimie's large petrochemical works should be completed this summer. The first part of the plant began operating last September.

China Buys Fertiliser Installations From Poland

'Cekop', the Polish foreign trade enterprise, has sold to China installations for three nitrogen fertiliser plants for the sum of 7,800,000 roubles. This is the first contract for the supply of Polish chemical plant equipment to China.

Petrochemical Firm for Brazil

It is reported from Sao Paulo by the B.o.T. Export Services Branch that a new firm has been set up to produce chemical, petrochemical and plastics materials. The company is called Cia. Petroquimica Nacional 'Copenal,' Rua Washington Luiz 236, sala 400, Sao Paulo.

Continued Increase in West German Chemical Exports

For the first three-quarters of 1958, West German exports of chemical products continued to increase, the Association of the West German Chemical Industry reports. Exports rose by 1.6% to DM.3,400 million.

Sales to countries outside Europe showed a decline, falling 7 million to DM.1,320 million. Increased international competition, a lower purchasing strength of the main raw material supplier countries, and the fact that an increasing number of former good buyer countries were setting up chemical plants of their own, were stated by the association to contribute to this development. Sales to Asia, primarily India, Indonesia and Japan, showed a particularly large decline.

West German exports of chemical products to European customers developed satisfactorily in general. The west European buyer was Holland who imported DM.225 million worth of West German chemical goods in the first quarter of 1958, nearly DM.12 million more than in the same period of 1957.

In the period under review West German chemical imports rose by 7.5% to DM.1,280 million. The main foreign supplier was Switzerland. It is expected that the industry's total sales will have increased to DM.18,000 million in 1958, against DM.17,200 million in 1957.

Pharmaceuticals in India

In a further stage of its plan to increase the Indian pharmaceutical industry (CHEMICAL AGE, 15 November 1958, 811), the country's Government has approved the formation of a new Indian-U.S. company, Merck-Sharp and Dohme (India) Private Ltd., for the production of pharmacological products and drugs. The company is a venture of the American Merck-Sharp and Dohme International concern, which have, it is sated, a 60% interest, and of the Indian company, Tata Sons Private Ltd., which, with its associated companies, will hold the remaining 40% of the authorised capital of rupees 42 million.

The company which will come into operation during next year with the production of Vitamin B_{12} and steroids using Merck patents, will be one of the country's major concerns in its field.

Italy Suspends Quicksilver Tax

A Bill has been introduced in the Italian Senate by the Finance Minister, suspending the manufacturing tax on quicksilver ores and derivates for two years from 1 February. The ministerial report accompanying the Bill has stated that the projected measure was due to the critical situation in which the Italian quicksilver industry has now found itself regarding exports arising out of heavy competition from Spain, Mexico and Yugoslavia.

The tax which was introduced in November 1954, is at the rate of Lire 32,000 per kilo in flasks and 800 in ore.

Denmark's New Patent Bill

Three Bills have been laid before the Folketing designed to amend the Patents Act, abolish temporary war-time legislation and provide a basis for a new Trade Marks Act. The Patents Bill will permit an increase in patents fees. The Trade Marks Act, which is the work of a committee formed in 1949 by the four Scandinavian countries, will bring about uniformity of practice in the four Nordic countries and bring Danish legislation more into line with international practice.

Resinas Sinteticas Lda. Now in Operation

The new synthetic resin plant Resintela (Resinas Sinteticas, Lda), Mato da Charneca, Mem Martins, Portugal, which was opened officially at the end of last year is the first factory of its kind to produce synthetic resins in Portugal, and production of a number of Reichhold resins is in progress. It is planned to add basic chemicals to the production line later on. The companies interested in Resintela are: Companhia Geral de Combustiveis, S.A.R.L., Sociedade Central de Resinas, Sepulchre Limitada, Sociedade Comercial de Resinas and Reichhold Chemie A.G.

The modern plant is located on 14 acres, situated 10 miles north of Lisbon on the main Sintra Highway. The factory area includes a pilot plant, a modern equipped laboratory, offices, workmen's quarters and a medical post.

Resintela have as technical advisers Reichhold Chemie A.G. of Hamburg, Germany, an associate of Reichhold Chemicals, Inc., U.S.

Stockbarger Process For Automatic Salt Production

A new German apparatus for the fully-automatic production of salt monocrystals with melting points of up to about 1,350°C by the Stockbarger process is described by G. Schreiber (*Journal of the Humboldt University of Berlin*, Vol. 6 (Wissenschaftliche Zeitschrift der H.-Universität Berlin, VI)).

The equipment consists of a tubulated furnace apparatus with silicon-bar heating, a lowering apparatus for the crucible and a photo-electric regulator with a platinum-platinum rhodium thermoelement as measuring member. In crystallisation the temperature may be within 0.02°C. A control apparatus sets off an alarm signal at any interruption of the crystal-forming process, thus enabling the crystallisation to be carried out fully automatically.

The crucible used is of sinter corundum; this has the advantage of easy emptying after crystallisation and greater constancy of melting temperature (±0.00014°C.) The rock salt crystals formed show no noticeable dispersion in ultra-violet rays, it is stated.

SASOL Chemical Division to Sell Products Worth £2¾ m. a Year

OPERATIONS of the South African Coal, Oil and Gas Corporation Ltd. (SASOL), are playing an increasing part in the development of South Africa's chemical industry. The plant and its associated township of Sasolburg have been established since 1950; it is built on a low grade coal field where coal can be mined at about 5s. a ton. There is also an abundant supply of water. At the current rate of production, 7,600 tons a day, the coal supplies available are estimated to suffice for 100 to 150 years. An oxygen plant built on the site produces 1,800 tons of oxygen per day from liquefied air. Lurgi gasifiers produce crude gas, comprising essentially a mixture of carbon monoxide and hydrogen, from crushed coal, steam and oxygen. Two synthesis plants are in use, the U.S. Kellogg and the German Ruhrchemie/Lurgi systems. It is expected that maximum output will be achieved by SASOL by 1961.

Products	Present Ann. Output 1958	Estimated Ann. Output 1961
Petrol, diesel and other fuel oils	32,000,000 g.p.a.	50,000,000 g.p.a.
Paraffin waxes ...	10,000 sh. tons p.a.	12,000 sh. tons p.a.
Creosote and tars	1,500,000 g.p.a.	1,700,000 g.p.a.
Crude phenols ...	800,000 g.p.a.	1,000,000 g.p.a.
Amm. sulphate ...	45,000 sh. tons p.a	52,000 sh. tons p.a.
Oxygenated solvents	700,000 g.p.a.	1,250,000 g.p.a.

g.p.a. = gallons per annum
sh. tons = short tons = 2,000 lb.

Motor benzol, tar crude phenols and ammonia are provided by coal gasification. About 13,000 tons of ammonia a year are recovered from gas liquor from the coal gasified. This is converted to about 50,000 tons of ammonium sulphate (about 50% of the Union's current requirements) for sale to fertiliser works.

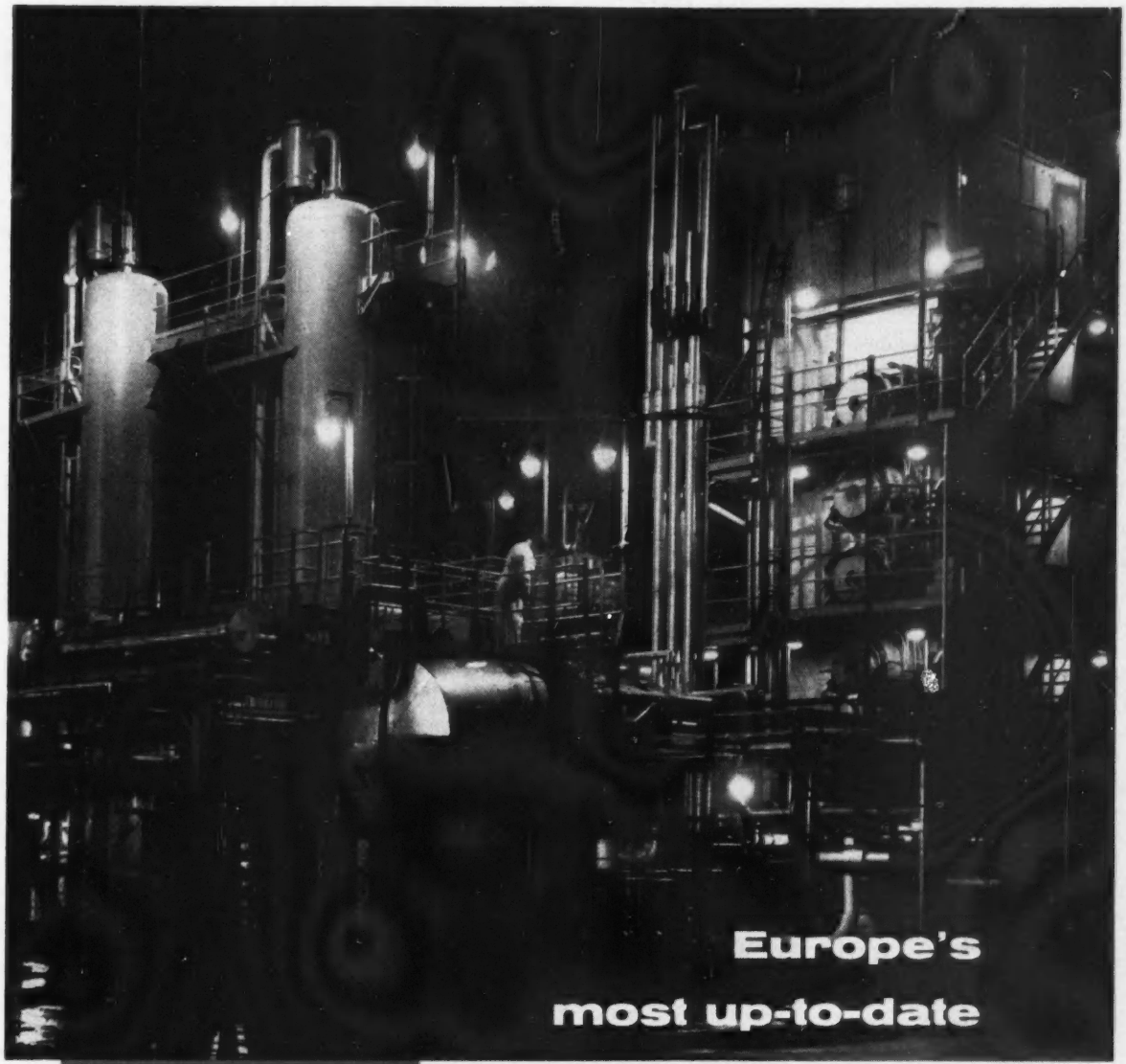
As has already been reported, joint U.K. and Dutch interests are erecting a £2½ million fertiliser factory at Sasolburg for the production of sulphuric acid, superphosphates and compound fertilisers. Due to be completed towards the end of this year it will produce initially up to 200,000 tons superphosphates, 112,000 tons of compound fertilisers and 75,000 tons of sulphuric acid a year. At present the 5,000 tons of crude phenol mixture recovered is being exported.

A series of alcohols, ketones and paraffin waxes are produced by the synthesis plants. The present output of methanol is being used internally, but could form a raw material for formaldehyde production and for plastics. Ethanol now used for blending into motor spirit could form the raw material for production of ethylene for the plastics and synthetic rubber fields. It is expected that propanol will find an application as a raw material. Butanol is used as a solvent and as a solvent raw material. Acetone and methyl ethyl ketone are also being produced in quantity. (*Board of Trade Journal*, 1958, **175**, No. 3230, 1342.) Liquid petroleum gas and a mixture of propane and butane are being sold at present as fuel. A range of paraffin waxes is produced; those with high melting wax qualities (200°F) are mostly exported. Being capable of modification to oxyderivatives these present new application possibilities.

Also available in various streams, are the following chemicals:

Sulphur and carbon dioxide, 10 to 20 tons/day of sulphur in the form of H_2S as a 2% concentration in CO_2; propylene and butylenes, 20,000 and 16,000 tons/year at 30% and 15% concentrations respectively in a mixed gas-stream; fatty acids, 8,000 tons/year of mixed organic acids, acetic and higher; higher alcohols, 1,000 tons/year; α-olefins, 30,000 tons/year in 70% concentration; kogasins, 10,000 tons/year in pure form but not saturated; and synthesis gas.

The Union Government has so far invested £48 million in SASOL and a further consolidation scheme is expected to cost some £4 million. SASOL's products are being marketed by SASOL Marketing Co. Ltd. The chemicals division of this company has been set up to sell approximately £2½ millions worth of products annually, both in South Africa and abroad.



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27

Commercial News

- **William Briggs Report Lower Earnings**
- **B.T.R. Industries to Acquire Microcell**
- **Dorman-Long's Tar Output Cut**
- **Morgan Crucible and Dividend Policy**

William Briggs

Lower earnings are reported by William Briggs and Sons for the year ended 30 September last, due to a combination of causes. These include lower turnover due to restrictions in capital expenditure on new construction work, and higher working costs, wage increases and bearing the strain of fixed-price contracts and of goods subject to fixed selling prices.

Trading profit and investment income amounts to £332,050 (£426,091). Net profit is £137,009. A final dividend of 9% is being paid on ordinary, making a total of 14% on ordinary capital, which was doubled in May last by the capitalisation of £350,000 of revenue reserve and a one-for-one issue of ordinary shares.

Sales of bituminous road binders during the year have been fully maintained. A steady trade in exports of the company's products has been enjoyed, and there has been an increase in volume over 1957.

The Dundee factory for oil and bitumen refining has again operated to capacity. Shipping of lubricating oil to the Far East has enabled the company to balance their refining programme within narrower limits. Their tar distilling trade continues to fit in with their general plan and the usual tonnage has been handled.

B.T.R. Industries

Engineers in rubber and thermoplastics, B.T.R. Industries have reached an agreement in principle for the acquisition of all the capital of Microcell and its associated companies, Glass Yarns and Deeside Fabrics and Artrite resins, against the issue of 820,000 ordinary 5s. shares and payment of £50,000 cash. The total offer is worth some £557,000.

Trading results of the B.T.R. group for the year ended 30 September last, subject to audit, show a substantial reduction, the profit before tax being £749,394, compared with £1,295,804.

The present directors of Microcell will continue in office. Mr. H. Kremer will remain chairman and managing director and will also join the board of B.T.R. Dr. W. D. Scott, assistant managing director of B.T.R. and Major C. J. P. Ball, another B.T.R. director, are to join the Microcell board.

Dorman-Long (Chemicals)

Profits from chemicals, engineering and bridge building, announce Dorman Long and Co., fell from £3,086,000 to £2,915,000. This is mainly due, it is stated, to the reduction in the ordinary dividend from Dorman Long (Africa Ltd.) which is no longer a subsidiary company included in this section.

Of Dorman Long (Chemicals) Ltd., it is reported by the chairman, Sir Ellis Hunter, that all the new units included in Stage III of the development plan have operated during the year ended 30 September 1958, and have given a highly satisfactory performance. Outputs have increased and would have been still higher, it is stated, but for the slowing down of operations at the iron and steel works which resulted in supplies of crude tar and benzole from the coke ovens being reduced.

Morgan Crucible

An ordinary interim dividend of 5% (3¼%) is announced by Morgan Crucible Co. The directors state that primarily the increase has the intention of achieving a more even distribution between the interim and final payments. Group profits for the first six months of the financial year ending 31 March 1959, they report, are not higher than in the previous year, when there was a final dividend of 6¼%.

INCREASES OF CAPITAL

British Ratin Co. Ltd., 125 Pall Mall, London S.W.1. Increased by £150,000 beyond the registered capital of £150,000.

Swan Chemical Co. Ltd., 40 Brazennose Street, Manchester, 2. Increased by £7,500 beyond the registered capital

Market Reports

Price Increase for n-Butyl Alcohol

LONDON The industrial chemicals market is gradually returning to normal activity with contract deliveries to home consumers covering good quantities. A fair volume of new inquiry on home and export account has been reported, and the outlook generally has a note of confidence.

Most quotations are steady at recent levels and the undertone is firm. n-Butyl alcohol price schedule has been amended and, as from 1 January the new price for 1-ton lots in 40/45 gal. drums is £152 per ton delivered. Zinc oxide is reported to be 30s. per ton dearer. Other price changes were notified last week.

There has been nothing of fresh importance to report for the coal tar products markets, and business remains quietly steady.

MANCHESTER Reasonably steady trading conditions have been reported for heavy chemical products after the recent holiday dullness. On the home market, leading industrial consumers of alkalis and other bread-and-butter lines have been calling for a resumption of deliveries, and a fair flow of additional inquiries on both home and export accounts has been reported. The steady to firm undertone of prices has been maintained. There has been more activity for fertiliser materials, with a steady business in the tar products.

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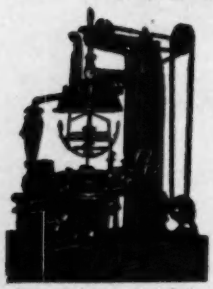

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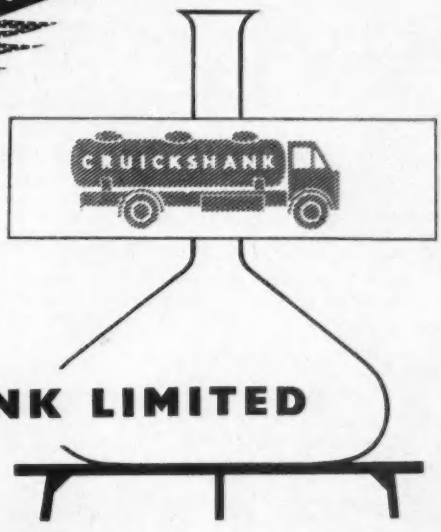

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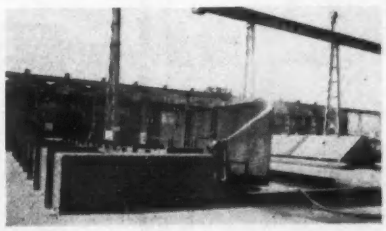

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10 January 1959 CHEMICAL AGE 103

Commercial News

- **William Briggs Report Lower Earnings**
- **B.T.R. Industries to Acquire Microcell**
- **Dorman-Long's Tar Output Cut**
- **Morgan Crucible and Dividend Policy**

William Briggs

Lower earnings are reported by William Briggs and Sons for the year ended 30 September last, due to a combination of causes. These include lower turnover due to restrictions in capital expenditure on new construction work, and higher working costs, wage increases and bearing the strain of fixed-price contracts and of goods subject to fixed selling prices.

Trading profit and investment income amounts to £332,050 (£426,091). Net profit is £137,009. A final dividend of 9% is being paid on ordinary, making a total of 14% on ordinary capital, which was doubled in May last by the capitalisation of £350,000 of revenue reserve and a one-for-one issue of ordinary shares.

Sales of bituminous road binders during the year have been fully maintained. A steady trade in exports of the company's products has been enjoyed, and there has been an increase in volume over 1957.

The Dundee factory for oil and bitumen refining has again operated to capacity. Shipping of lubricating oil to the Far East has enabled the company to balance their refining programme within narrower limits. Their tar distilling trade continues to fit in with their general plan and the usual tonnage has been handled.

B.T.R. Industries

Engineers in rubber and thermoplastics, B.T.R. Industries have reached an agreement in principle for the acquisition of all the capital of Microcell and its associated companies, Glass Yarns and Deeside Fabrics and Artrite resins, against the issue of 820,000 ordinary 5s. shares and payment of £50,000 cash. The total offer is worth some £557,000.

Trading results of the B.T.R. group for the year ended 30 September last, subject to audit, show a substantial reduction, the profit before tax being £749,394, compared with £1,295,804.

The present directors of Microcell will continue in office. Mr. H. Kremer will remain chairman and managing director and will also join the board of B.T.R. Dr. W. D. Scott, assistant managing director of B.T.R. and Major C. J. P. Ball, another B.T.R. director, are to join the Microcell board.

Dorman-Long (Chemicals)

Profits from chemicals, engineering and bridge building, announce Dorman Long and Co., fell from £3,086,000 to £2,915,000. This is mainly due, it is stated, to the reduction in the ordinary dividend from Dorman Long (Africa Ltd.) which is no longer a subsidiary company included in this section.

Of Dorman Long (Chemicals) Ltd., it is reported by the chairman, Sir Ellis Hunter, that all the new units included in Stage III of the development plan have operated during the year ended 30 September 1958, and have given a highly satisfactory performance. Outputs have increased and would have been still higher, it is stated, but for the slowing down of operations at the iron and steel works which resulted in supplies of crude tar and benzole from the coke ovens being reduced.

Morgan Crucible

An ordinary interim dividend of 5% (3¼%) is announced by Morgan Crucible Co. The directors state that primarily the increase has the intention of achieving a more even distribution between the interim and final payments. Group profits for the first six months of the financial year ending 31 March 1959, they report, are not higher than in the previous year, when there was a final dividend of 6¼%.

INCREASES OF CAPITAL

BRITISH RATIN CO. LTD., 125 Pall Mall, London S.W.1. Increased by £150,000 beyond the registered capital of £150,000.

SWAN CHEMICAL CO. LTD., 40 Brazennose Street, Manchester, 2. Increased by £7,500 beyond the registered capital

Market Reports

Price Increase for n-Butyl Alcohol

LONDON The industrial chemicals market is gradually returning to normal activity with contract deliveries to home consumers covering good quantities. A fair volume of new inquiry on home and export account has been reported, and the outlook generally has a note of confidence.

Most quotations are steady at recent levels and the undertone is firm. n-Butyl alcohol price schedule has been amended and, as from 1 January the new price for 1-ton lots in 40/45 gal. drums is £152 per ton delivered. Zinc oxide is reported to be 30s. per ton dearer. Other price changes were notified last week.

There has been nothing of fresh importance to report for the coal tar products markets, and business remains quietly steady.

MANCHESTER Reasonably steady trading conditions have been reported for heavy chemical products after the recent holiday dullness. On the home market, leading industrial consumers of alkalis and other bread-and-butter lines have been calling for a resumption of deliveries, and a fair flow of additional inquiries on both home and export accounts has been reported. The steady to firm undertone of prices has been maintained. There has been more activity for fertiliser materials, with a steady business in the tar products.

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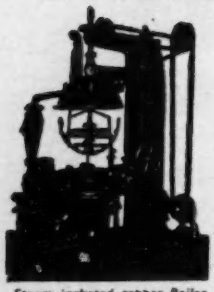

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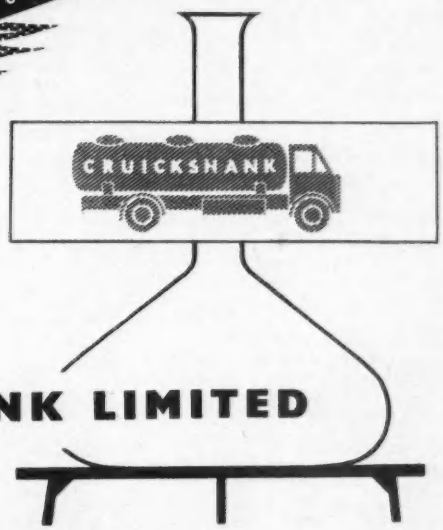
LITHIUM FLUORIDE

TIN FLUOBORATE

POTASSIUM FLUOBORATE



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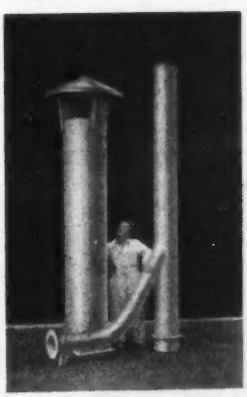

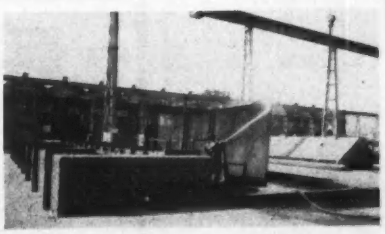

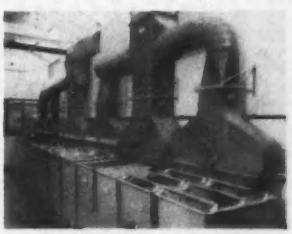

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TRADE NOTES

Nopco U.K. Agents

Adolph Hess and Bro. Ltd., Oil and Stearine Works, Kirkstall Road, Leeds 3, have been appointed agents in the U.K. and Eire for the Nopco Chemical Co., New Jersey. Nopco manufacture a wide range of processing aids for many industries, including paper, textiles, paints, leather and adhesives. Many of the products will be made by Hess.

Nopco report that demand for their products in the U.S. and elsewhere is increasing rapidly; their output is backed by a technical and development service.

Instrumentation by Gordon

Following the amalgamation of the Power Plant Division of Elliott Bros. (London) Ltd., with James Gordon and Co., Ltd., at Dalston Gardens, Stanmore, on 1 January, Gordon can in future offer schemes for complete instrumentation and control (either pneumatic or electronic), for nuclear and thermal power stations, process steam plants, heating, ventilating and air-conditioning plants, etc.

Changes of Address

From 1 February, the address of the Mulberry Company, suppliers of stainless steels, will be Castle Wharf, Orchard Place, London E.14 (East 4471).

The south eastern area office of Birlec Ltd., manufacturers of heat treatment furnaces, driers and gas plants, has been transferred to Crown House, Aldwych, London W.C.2 (Temple Bar 8040). The south eastern area office of Birlec-Efco (Melting) Ltd. has also been established at the same address. The offices provide a sales organisation and service facilities.

Coloured P.V.C. Sacks

P.V.C. Vitherm coloured sacks are being introduced to the U.K. market by K.W. Chemicals Ltd., 55-57 High Holborn, London W.C.1. These sacks, made from high-frequency double-welded 9/1,000 in. and 12/1,000 in. gauge p.v.c. of high mechanical strength, have been used on the Continent for the past two years in increasing quantities. Their great tensile strength, and the fact that they are waterproof and water-vapour proof, as well as being impervious to vermin, makes them ideal as packaging, particularly for agricultural, horticultural and other chemicals. They can be supplied in house colours with contrasting printing. Vitherm sacks are available in capacities up to 1 cwt.

Diversey Acquire Deosan

The Diversey Corporation of Chicago, U.S., have acquired the factory of Deosan, of Riddings, Derbyshire. The company will use the Deosan factory to step up its output of fertilisers, detergents and pharmaceuticals.

New Telephone Number

The Bexley Heath telephone number of Frederick Braby and Co. Ltd., has been changed to Crayford 26262.

Tube Marking Range

The Tubekoda marking and coding machine for tubes and rods, produced by Mark-o-Print Ltd., Station Path, Putney Bridge Station, London S.W.6, has now had its range increased on the upper limit from 4 in. to 6 in. The lower range was also increased recently to 3/16 in. The Tubekoda will therefore now print tubes up to 6 in. diameter.

Chemico's New Contract

A new contract for a P.A. venturi gas scrubber has been given to Chemical Construction (G.B.) Ltd., by John Allen and Co. (Glenpark) Ltd., for the removal of lead fume from gases from rotary and reverberatory furnaces at their Glasgow works.

B.T.R. Industries

Manufacturing rights in Great Britain of the product known in France as Klegecell and in this country as Plasticell have been acquired by B.T.R. Industries Ltd. from Kléher-Colombes of Paris.

Plasticell is a closed cell cellular p.v.c. and is available in rigid and flexible forms in thicknesses from ½ in. to 3 in. Its constitution, it is stated, gives excellent physical and chemical properties. The high strength/weight ratio and low thermal conductivity factor of the rigid grades make them suitable for use in 'sandwich' constructions possessing high strength and rigidity, and good insulation.

Production of the rigid grades is expected to begin about mid-1959. In the interim period, all requirements for Plasticell will be met by continued imports from France. As from 1 January, B.T.R. Industries have, therefore, taken over the selling rights in this country.

DIARY DATES

MONDAY 12 JANUARY

S.C.I.—Leeds: Hotel Metropole, 7 p.m. 'Fluorimetry and Spectrofluorimetry', by C. A. Parker.

TUESDAY 13 JANUARY

Plastics Inst.—Glasgow: Inst. of Engineers & Shipbuilders, 7.30 p.m. 'Moulding and forming of high density polythene'.

S.A.C.—Birmingham: Mason Theatre, University, Edmund St., 6.30 p.m. Discussion on 'Analytical chemistry of cobalt and nickel', to be opened by A. J. Brookes.

S.C.I. (Chem. Eng.)—London: 14 Belgrave Sq., S.W.1., 6 p.m. 'An organisation for inspection', by E. W. Greensmith.

WEDNESDAY 14 JANUARY

Inst. Physics—London: Royal Inst., 21 Albermarle St., W.1., 5.30 p.m. 'Controlled thermonuclear reactions', by Sir George Thomson.

Plastics Inst.—Bath: Royal York House Hotel, 7 p.m. 'Comparison of processes used in rubber and plastics industries', by K. Wilson.

Plastics Inst.—Cardiff, Angel Hotel, 6.30 p.m. 'Unorthodox nylon processes'.

THURSDAY 15 JANUARY

C.S.—London: Imperial College, S.W.7., 7.30 p.m. Tilden lecture: 'Nucleotides and bacterial cell wall components', by J. Baddiley.

I.Chem.E.—Thornaby-on-Tees: Head Wrightson, Trafalgar St., 6.45 p.m. 'Use of models in chemical plant design', by G. F. Barker.

S.C.I. with C.S. & R.I.C.—Aberdeen: Marischal College, 7.30 p.m. 'Recent developments in porphyrin field', by G. W. Kenner.

FRIDAY 16 JANUARY

C.S.—Birmingham: University, 4.30 p.m. 'Protein biosynthesis' by C. E. Dalgliesh.

C.S.—Exeter: Washington Singer Labs., 7.15 p.m. 'Recent developments in porphyrin field', by G. W. Kenner.

Plastics Inst.—Birmingham: James Watt Memorial Institute, 6.30 p.m. 'The nylon story', by W. E. Batten.

R.I.C.—Manchester: College of Science & Technology. A.G.M. and chairman's address.

S.C.I.—London: 14 Belgrave Sq., London, S.W.1., 6.30 p.m. 'Development of aromatic and perfumery chemicals', by E. E. Boake.

S.C.I.—Newcastle upon Tyne: Chemistry Dept., King's College, 5.30 p.m. 'Industrial approach to basic research: fabric substantive fluorescing agents', by E. R. Wilson.

S.C.I. with R.I.C.—Plymouth: Technical College, 5.30 p.m. 'Sequestering agents', by R. L. Smith.

S.D.C.—Manchester: 10 Blackfriars St., 7 p.m. 'Degradation of chemically modified celluloses by alkali', by W. M. Corbett.

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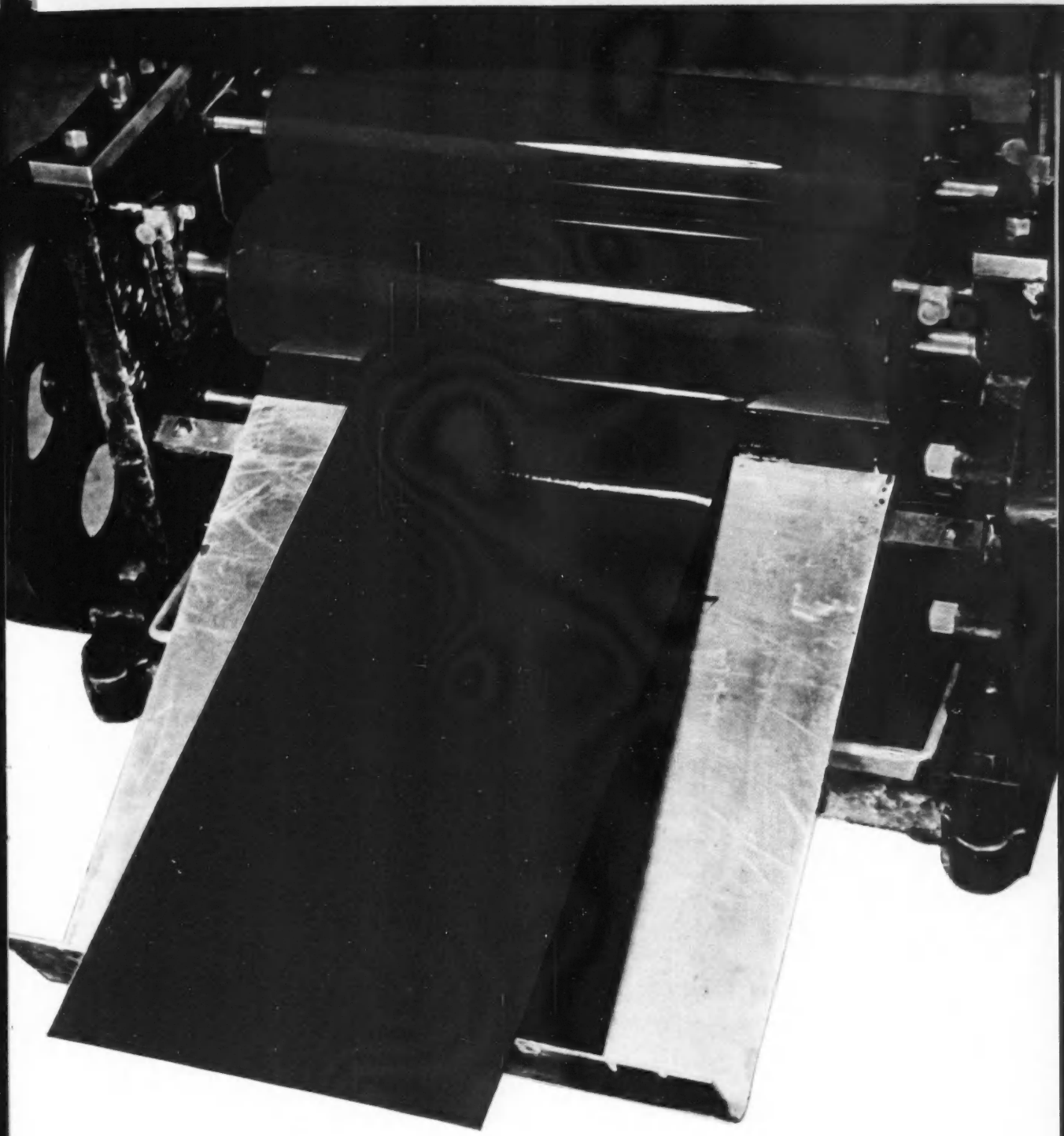

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NEW PATENTS

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

AMENDED SPECIFICATIONS

On Sale 4 February

Pigmented prints and coatings on fibrous material. Badische Anilin- & Soda-Fabrik (I.G. Farbenindustrie A.G. "In Auflosung"). **701 139**

Water-soluble methyl celluloses. Henkel & Cie. Ges. **754 876**

On Sale 11 February

Reducing photochemical damage to super polyamides and polyurethanes. Inventa A.G. fur Forschung und Patentverwertung. **718 405**

Solvent medium for the anthraquinone process for the production of hydrogen peroxide. Allied Chemical & Dye Corp. **768 814**

ACCEPTANCES

Open to public inspection 11 February

Linear polyamide compositions. Chemstrand Corp. **808 907**

Tropeine derivatives. Licencia Talalmanyokat Ertekesito Vallalat. **808 926**

Activation of aluminum. Koppers Co., Inc. **808 705, 808 706 & 808 707**

Phenthiazine derivatives. Soc. Des Usines Chimiques Rhone-Poulenc. [Addition to 780 193.] **808 959**

Preparation of mixed glycerol ester compositions. Eastman Kodak Co. [Addition to 745 566.] **808 634**

Amino derivatives of esters of 2-phenyl isovaleric acid. Morren, H. **808 960**

Elastomeric polymers and their production. Du Pont de Nemours & Co., E. I. **808 635**

Basically substituted heterocyclic compounds. Cassella Farbwerke Mainkur A.G. **808 636**

Recovery of selenium. Diamond Alkali Co. **808 637**

Organic phosphoric acid triamides. Farbenfabriken Bayer, A.G. **808 638**

Oxidation of sulphur dioxide to sulphur trioxide and catalysts therefor. Imperial Chemical Industries Ltd. [Cognate application 9 431.] **808 639**

Method of filling one container with condensed gas from another container. Lorentzen, H. L. **808 642**

Process for treating water used for irrigation purposes. Vermeiren, T. I. S. **808 645**

Method of manufacturing a filler for asphaltic bitumen. Keyzer, P. **808 785**

Cooling of solid and liquid substances. Szekely, G., and Klotsman, G. **808 690**

Removal of sulphur from blast furnace slag British Oxygen Co. Ltd. **808 788**

Fast dyeing of nitrogenous fibres with water-soluble metal-containing azo dyestuffs and acid milling dyestuffs. Sandoz, Ltd. **808 647**

Dyeing of polyacrylonitrile textile materials. Farbenfabriken Bayer A.G. **808 713**

Thiolcarbamates. Stauffer Chemical Co. **808 753**

Synthetic resins and abrasive articles formed therefrom. Union Carbide Corp. **808 755**

Preparation of substituted amino-carboxylic acid amides. Bochme Fettchemie G.m.b.H. **808 874**

Detergent compositions. Hedley & Co. Ltd., T. **808 668 & 808 945**

Process for the distillation of a multi-component mixture. Bataafsche Petroleum Maatschappij N.V., De. **808 965**

Improving the properties of polyethylene terephthalate threads and fibres and textiles fabrics manufactured therefrom. Vereinigte Glanzstoff-Fabriken A.G. [Addition to 808 525.] **808 967**

Production of methyl trimethylol methane. Deutsche Gold- Und Silber-Scheideanstalt Vorm. Roessler. **808 878**

Thiophosphoric acid esters. Farbenfabriken Bayer A.G. **808 879**

Production of glycol mono-ethers. Soc. Des Usines Chimiques Rhone-Poulenc. **808 880**

Dyeing process for polyesters and cellulose triacetate. Farbenfabriken Bayer A.G. **808 948**

17 α-Hydroxy-steroids. Reichstein, T. [Divided out of 808 903.] **808 904**

Sulphanilamido-isoxazole derivatives and a process for the manufacture thereof. Hoffman-La Roche & Co. A.G., F. **808 950**

Preparation of aromatic or heterocyclic dicarboxylic acids. Henkel & Cie. G.m.b.H. **808 894**

Production of vinyl acetate. Chemische Werks Hüls A.G. **808 828**

Linear polyamide compositions. Chemstrand Corp. [Divided out of 808 907.] **808 908**

Method of and equipment for cleansing surfaces of oily deposits. Groom, R. W. [Divided out of 808 901.] **808 902**

Open to public inspection 18 February

Method of separating uranium from thorium and protactinium. Musgrave, W. K. R. **809 282**

Sewage treatment. Smith, G. C. **809 245**

Coating of surfaces with aqueous emulsions of bitumen. Gunac, Ltd. **809 272**

Construction of distillation columns and like structures. A.P.V. Co., Ltd. **809 153**

Derivatives of cephalosporin N National Research Development Corp. **808 971**

Metering valve for use on centralised liquid distribution systems. Woll, R. V. [Cognate application 9 711, 11 656 and 14 735.] **809 123**

Method of electroplating non-conductive material. Furness, R. W. **809 247**

Manufacture of synthetic filaments. Imperial Chemical Industries, Ltd. [Cognate application 4 272.] **809 273**

Prevention of corrosion. Petrolite Corp. **809 001**

Brazing of titanium or titanium base alloys. Imperial Chemical Industries, Ltd., Salt, A. E., and Taylor, E. A. **809 125**

Heat-exchangers. Loughborough Glass Co., Ltd. **809 067**

Processes and apparatus for the production of ultra-pure substances. **809 250**

Treatment of a gaseous or vaporous material. Kellogg Co., M. W. **809 024**

Amines and processes for their production. May & Baker, Ltd. [Addition to 769 706.] **809 023**

Process for the regeneration of waste sand from cast off moulds and cores produced from chemically hardened mixtures. Pertzela, L. **809 283**

Production of titanium dioxide powders. Fabriques de Produits Chimiques de Thann et de Mulhouse. **809 284**

Processes of manufacturing luminescent silicates. Philips Electrical Industries, Ltd. **809 069**

Synthesis of steroids. Olin Mathieson Chemical Corp. **809 113**

Process for dyeing shaped structures of aromatic polyesters. Farbwerke Hoechst A.G. **809 221**

Manufacture of compounds of the anthraquinone series. Ciba Ltd. **809 222**

Basically substituted butyric acid anilides and process for their manufacture. Farbwerke Hoechst A.G. **809 286**

Process and apparatus for re-wetting water-wetted solid particles. Bergwerksverband zur Verwertung von Schutzrechten der Kohlentechnik G.m.b.H. **809 194**

Stabilisation of acaricidal compositions. Boots Pure Drug Co., Ltd. [Addition to 748 604.] **809 195**

Treatment of esters. Usines de Melle. **809 289**

Electrically conducting glass. Libbey-Owens-Ford Glass Co. **809 074**

Lubricant composition. California Research Corp. **809 198**

Apparatus for generating gaseous working fluid. General Electric Co. **809 031**

Bonding of fabrics to a surface or coating of polyvinyl chloride. Fothergill & Harvey (Research & Development), Ltd., and Vinyl Products, Ltd. **809 290**

Polymerisable compositions. Imperial Chemical Industries, Ltd. **809 257**

Dyeing of polyamide fibres. Geigy Co. Ltd. **809 258**

Combustible pastes. Cabot, Inc., G. L. **809 259**

Aluminium alcoholate derivatives. Hardman & Holden, Ltd., and Rinse, J. **809 309**

Parasiticidal drugs. National Research Development Corp. [Cognate application 23 319.] **809 295**

Dispenser for viscous liquids. Ashe Laboratories, Ltd. **809 037**

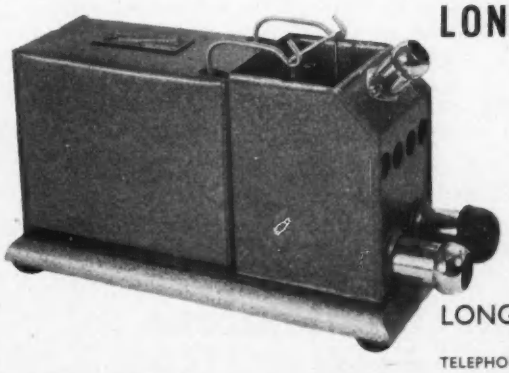
Manufacture of pyridoxine and its salts. Vitamins, Ltd. **809 298**

Method of curing of concrete. Foulger, F. **809 082**

Electrolytic cells. Pechiney Compagnie de Produits Chimiques et Electrometallurgiques. **809 299**

Process for preparing aromatic aldehydecarboxylic acids. Perfogit S.p.A. [Addition to 809 117.] **809 117 & 809 118**

Production of crimped tows of polyacrylonitrile filamentary materials. American Cyanamid Co. **809 039**



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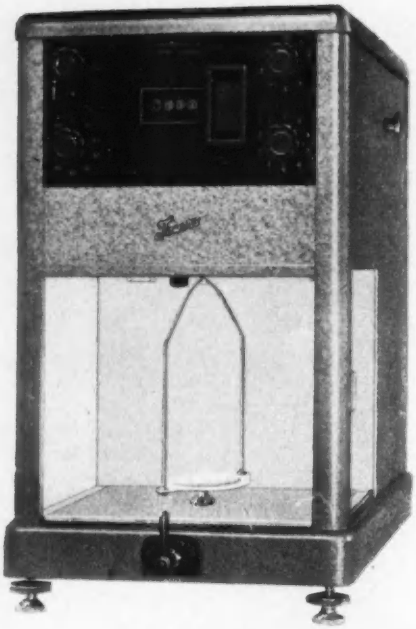

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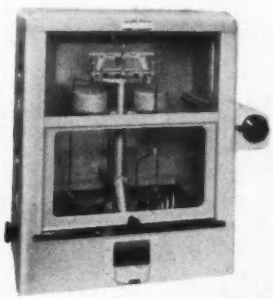

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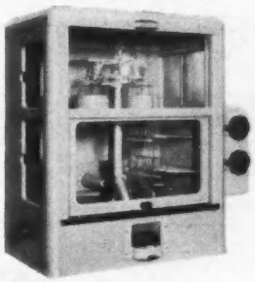

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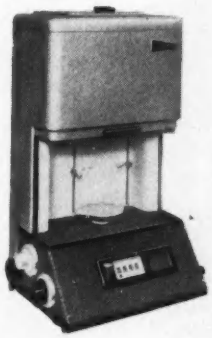

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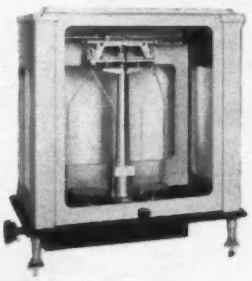

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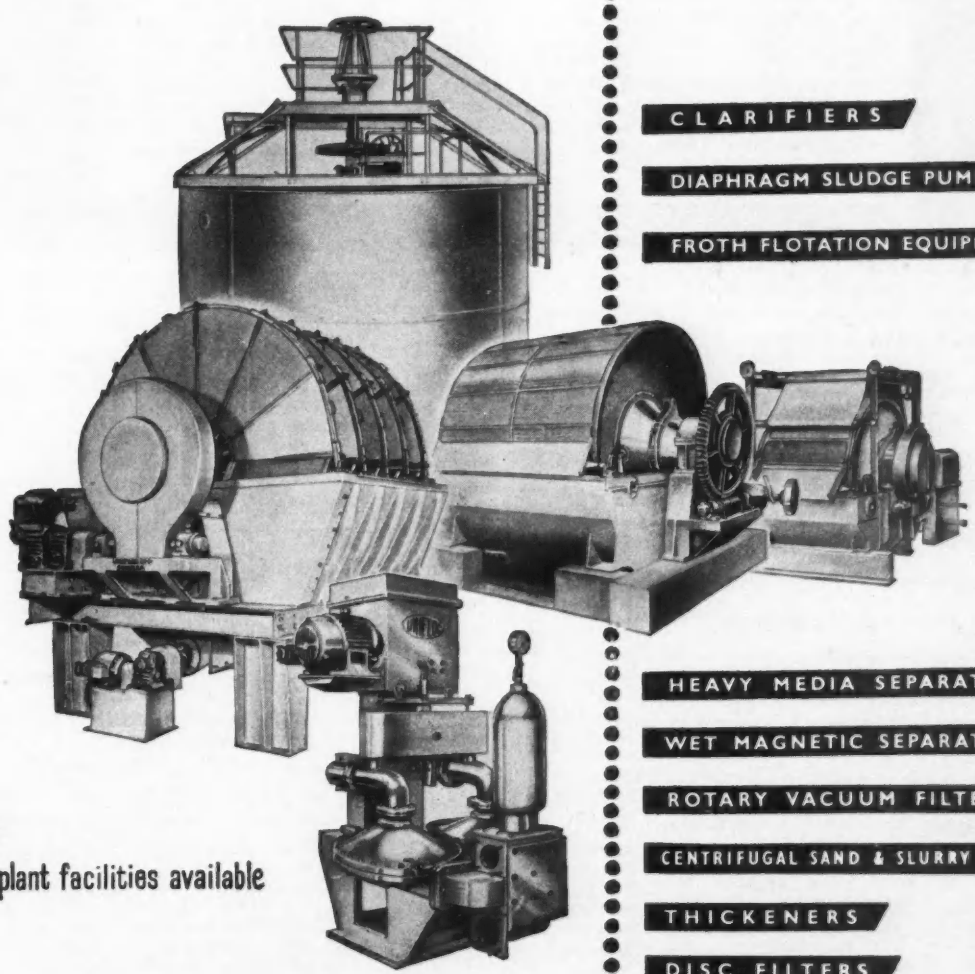

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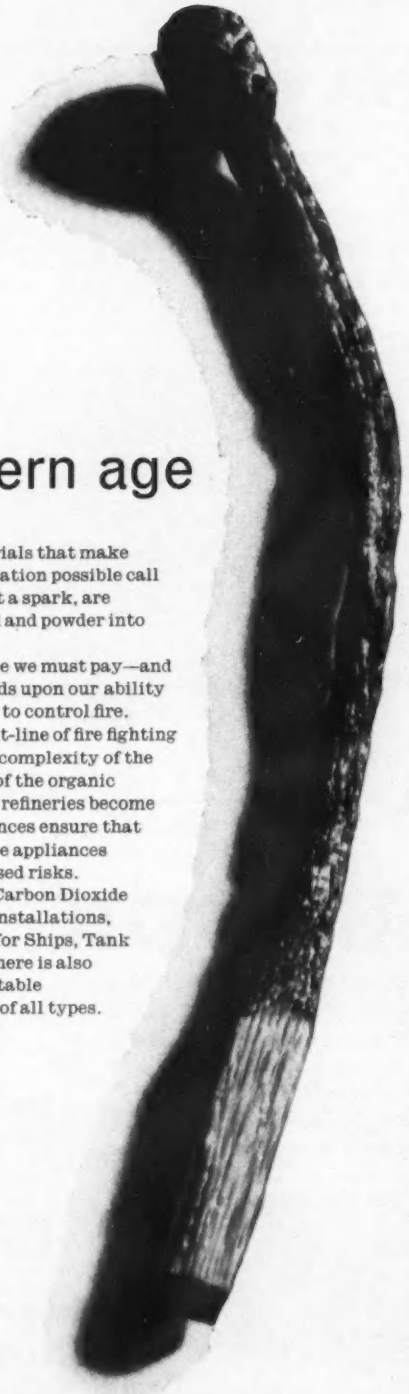

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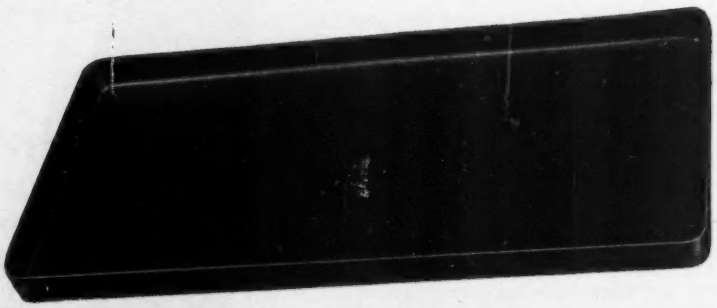

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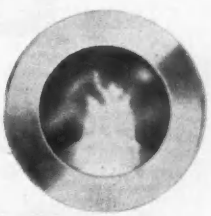

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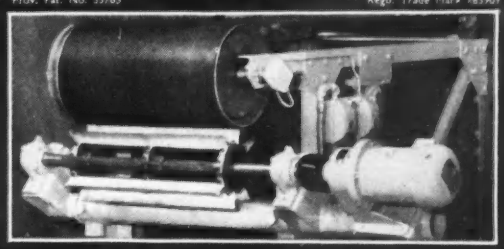

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